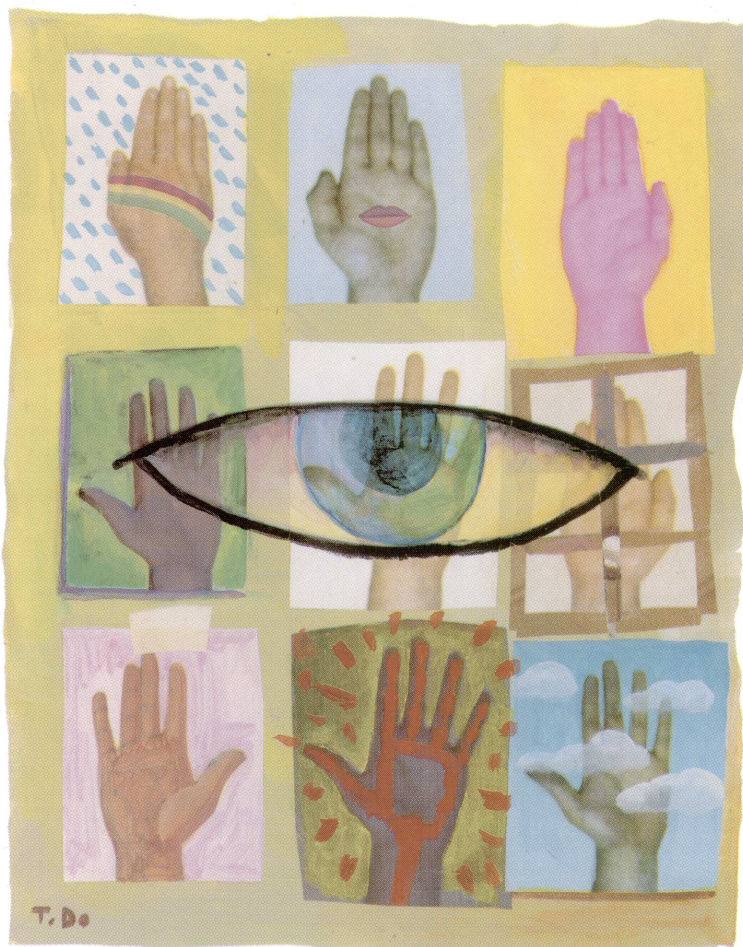


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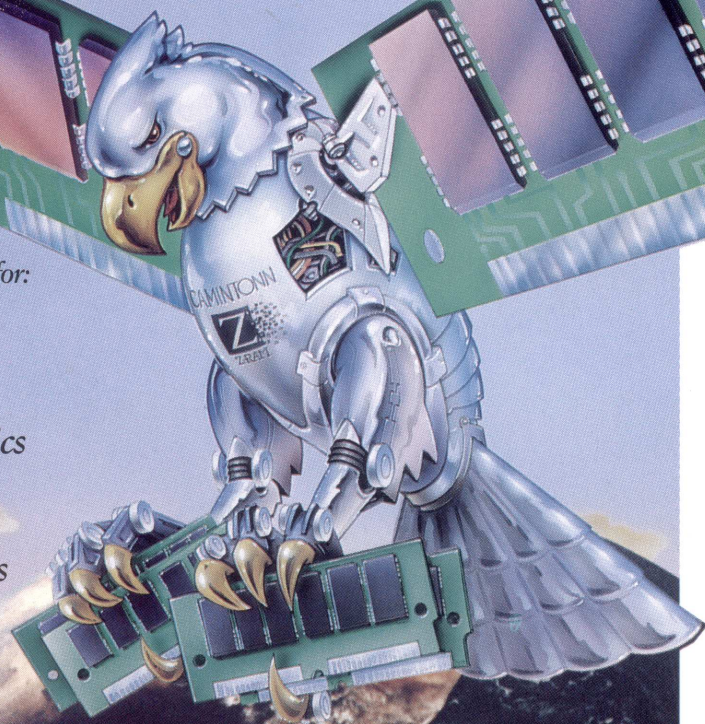
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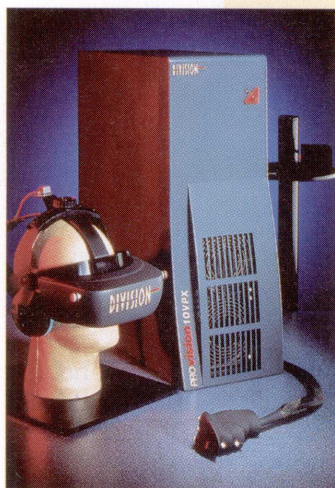
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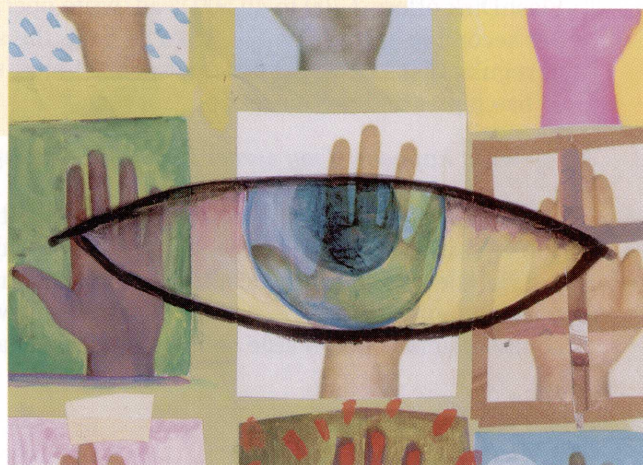
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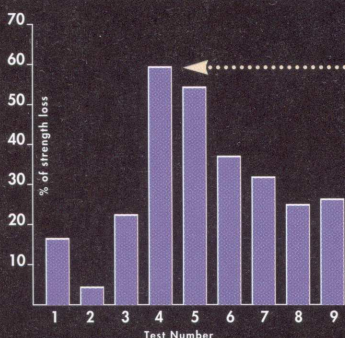
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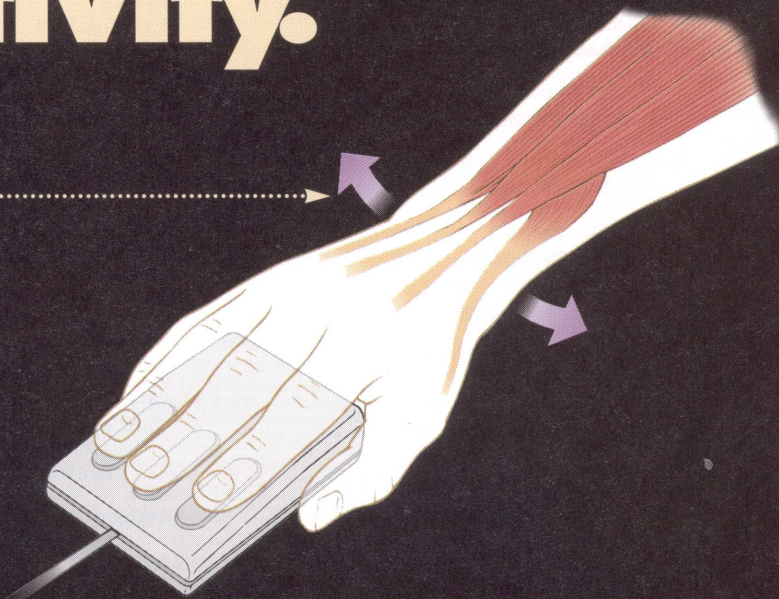


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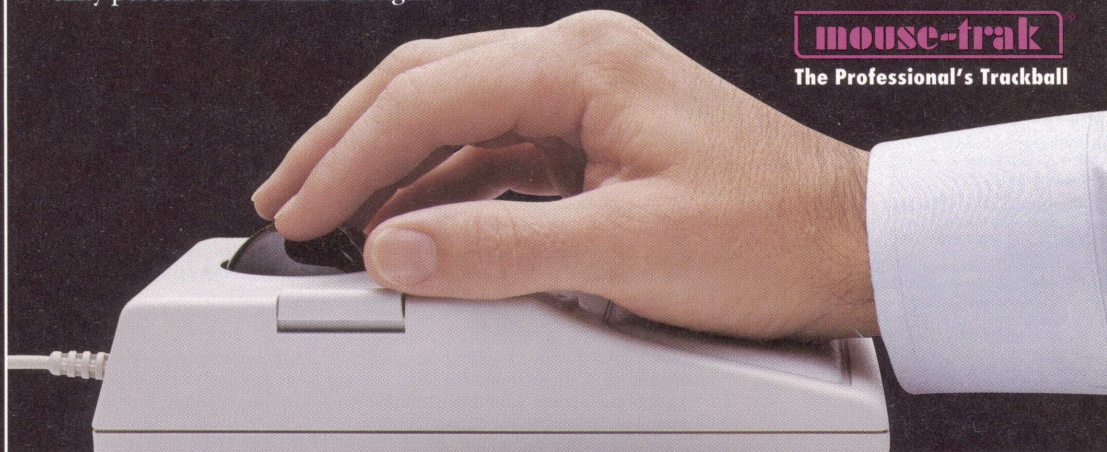
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hp-ux/usr is published bimonthly by Interex, the International Association of Hewlett-Packard Computing Professionals. Second-class application pending at Sunnyvale, California 94086 and additional offices. The editorial and business offices are located at 1192 Borregas Ave., Sunnyvale, California 94089, USA, 408.747.0227, Fax 408.747.0947. Address membership questions and change of address to Membership Services. Address all questions concerning circulation/distribution to the Distribution Manager.

Remittances should be sent to Interex,
File No. 61054, P. O. Box 60000,
San Francisco, California 94160, USA.

Address all editorial correspondence to Michael Ehrhardt,
Editor, *hp-ux/usr* Magazine, c/o Interex,
P.O. Box 3439, Sunnyvale, California 94088-3439, USA.

Subscription to *hp-ux/usr* is \$49.50 (6 issues) per year in the U.S. Add \$25.00 for Canada and Mexico; add \$50.00 for all other countries. Member Services (Associate, Contributing, or Online Service Package membership levels) include a subscription to *hp-ux/usr* at \$49.50. For other Member Services refer to membership form.

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Question & Answer

Q: I just installed 10.0 and tried to use *swinstall* to add the JetDirect software from the Applications CD, but it asks for a codeword. Where do I get the codeword?

A: For the 10.0 Application disc, codeword protection was inadvertently added to the CD for JetDirect. The software is available free of charge from the Application CD, so you can:

1. Call HP License Administration at (800) 538-1733.
2. Tell the agent that you have the codeword locked version of JetDirect/-JetAdmin on the HP-UX 10.0 CD ROM.
3. Give the agent the following information:
 - a. Product # J2374B
 - b. Disk # B392013601 for Series 800 (on Applications disk)
 B378210013 for Series 700 (on Applications disk)

The agent will give the codeword necessary to access JetDirect/JetAdmin for UNIX.

Q: What RAID levels will be available on the Series 800 and 700?

A: The RAID level supported depends on the disk array and the machine:

Series 700 and Series 800 machines support the F/W SCSI Cascade disk array. RAID levels on the Cascade are the same at 10.0 as they were at 9.04. The Series 700 and Series 800 support RAID levels 3 and 5, as well as independent mode. The Series 700 also supports RAID level 0, a level unsupported on the Series 800 by the Cascade (it's a firmware limitation).

Only the Series 800 machines support the High-Availability ("Nike") disk array. Levels 0, 1, 0+1, 5, and independent mode are supported on this array.

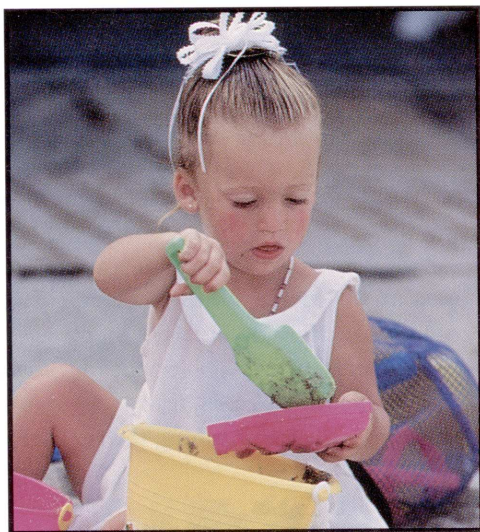
A technical note: Some of the documentation refers to independent mode as "individual mode"; the two terms mean the same thing. Independent mode is not a RAID level, but simply individual disk drives. Because independent mode accesses the disk array as a regular drive, there is no parity protection or image protection.

More information about disk arrays and RAID levels is available in the booklet entitled *Disk Arrays* (part number 5091-1396E).

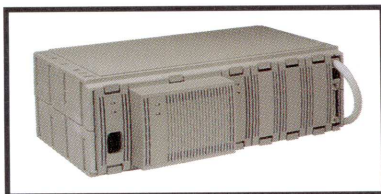
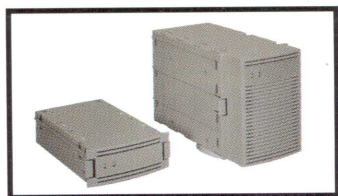
Q: What are the ways to set environment variables in VUE at 10.0?

A: Here are ways to set up VUE so that:

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1. All users inherit the same variable values in all shells
2. One user has values different from the others
3. All users who telnet (or remsh) to the system have the variable set, but not users logging in through VUE
4. Actions invoked from the user's front panel inherit a specific environment
5. Root window menu actions inherit a specific environment

There are a few variables that get set in their own global configuration files, e.g., */etc/MANPATH*, */etc/PATH*, */etc/TIMEZONE*, and */etc/SHLIB_PATH*.

If you want to change these variables so that they have new values that get inherited by all users, VUE or not, then edit the files. The files are actually explicitly "sourced" in by */etc/profile* and */etc/csh.login*.

1. All users inherit the same variable values in all shells?

The */etc/profile* script is executed for all users using VUE, no matter what their preference of shell. If you want to set variables other than those listed above, you can set them in */etc/profile* and they will get read for all VUE users, and for any non-VUE users using Bourne shell, POSIX shell, or Korn shell. For non-VUE csh users you would also have to set the variables in the */etc/csh.login* file.

2. One user has values different from the others?

The general environment customization file for VUE users is *\$HOME/.vueprofile*. Any VUE user can set personal environment variables there. Non-VUE users should set environment variables in *\$HOME/.profile* (sh, ksh) or *\$HOME/.login* (csh).

3. All users who telnet (or remsh) to the system have the variable set, but not users logging in through VUE?

The */etc/profile* has a section that gets executed specifically for non-VUE users; it starts with

```
if [ ! "$VUE" ]; then
```

You can make customizations specifically for non-VUE users (sh, ksh) by placing them in this section. For csh users, you will have to put equivalent customizations in the */etc/csh.login* file.

4. Actions invoked from the user's front panel inherit a specific environment, or

5. Root window menu actions inherit a specific environment?

There is no way to specify environment customizations for ALL front panel actions or ALL root menu actions. What you can do is customize the environment for SPECIFIC actions by having the action run a shell wrapper that sets the environment variables before running the real program.

Q: Why is VUE affected by the domain name server or NIS database server becoming unavailable? What is the best way to prevent this problem? Why does it affect VUE, but not x11start?

A: This is a common question at the Response Center. Here are some of the reasons and techniques to fix the problems:

VUE is a network-aware product and even requires a healthy network for single-host-only configurations. In particular, it needs to be able to look up your own node name using standard name services.

There are many options in network administration like backup and/or caching name servers. One of the simplest is to switch over to using */etc/hosts* (e.g., using */etc/resolv.conf*) when your name service gets sick. */etc/hosts* should have an entry for your host and all hosts you plan to use on the network (e.g., with remote VUE actions).

But why does it affect VUE, but not x11start? It turns out that X can be used with a down name server in a single-host-only configuration because with "DISPLAY=:0", X does not consult the name server (no host name is given in \$DISPLAY) and it uses UNIX-domain sockets for local communication, which do not depend on a healthy external network. VUE (specifically the BMS Broadcast Message Server) has no similar way to avoid host name lookups at present. In simpler terms, VUE is network-aware while X can be used in a mode that isn't.

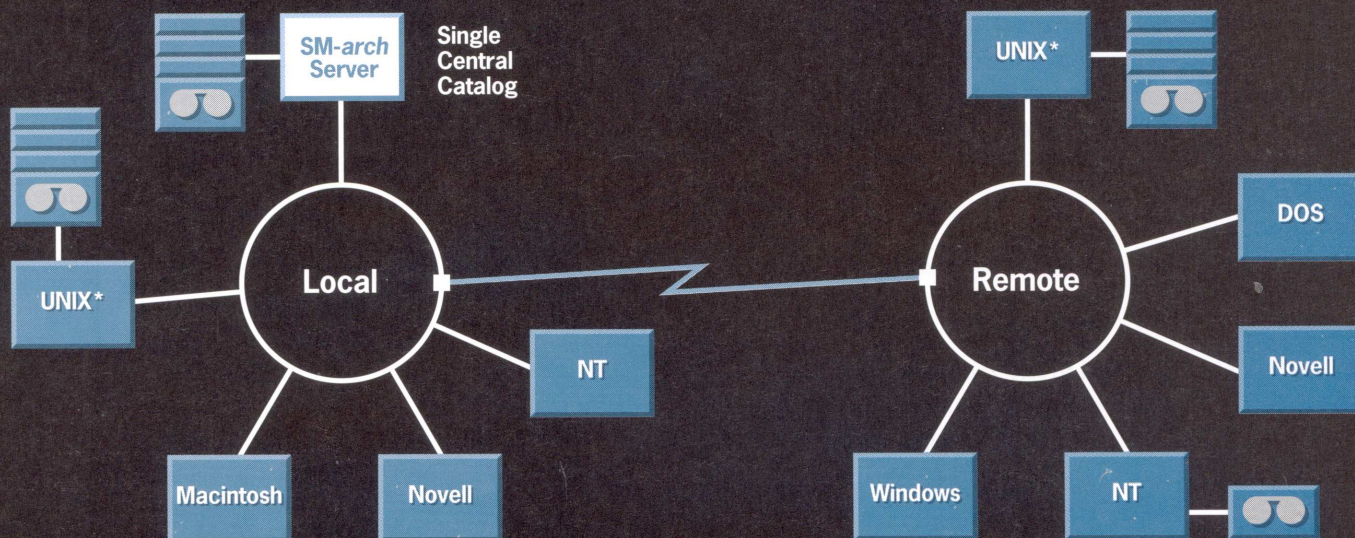
When VUE is affected but X is apparently unaffected, in reality X networking and all other networking services (telnet, remsh, ...) really are affected. To see X fail under those conditions, try a command like

```
$ DISPLAY=myhostname:0 xload
```


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If you try to use X for any remote access with a command such as

```
program -display myhostname:0
```

it will fail too.

In short, when the network is sick, all sorts of things will stop working. VUE is often the first thing that users notice. It doesn't make sense for VUE to try to work in this environment, since if people are using a name server, they are probably counting on networking for other important things (NFS, rlogin, telnet). If the users truly don't care about the network, it would be simpler for them to have a setup based purely on */etc/hosts* and isolate themselves from the LAN.

Q: Will patches retain old and new versions at 10.0 as they did at 9.X?

A: Yes. They will be saved in the */var/adm/sw/patch/* directory. Subdirectories in there (named after the individual patches) will contain files for each patch—scripts, the INFO file, and other housekeeping details for de-installation purposes.

Q: How will patches be installed at 10.0? How can I tell what patches are installed?

A: Patches will be distributed in SD format. Install them with the *swinstall* command.

You can see the patches that are installed on a system by running *swlist*. Patches are installed as products using the old familiar names of the form "PH*". Because the *swlist* command shows bundles by default, use the *swlist* option *-l product* to see the installed patches. Sample commands:

```
# swlist -l product          # list all products, which includes patches
# swlist -l product 'PH*'    # list all installed patches
# swlist -l fileset PH\*      # list filesets in all installed patches
# swlist -l fileset PHKL_4412 # list filesets in this one patch
```

Q: I forgot the name of the depot where the software I need to load resides. How can I find it out?

A: The easiest way is with interactive *swinstall*:

1. Run *swinstall* interactively (with no command-line arguments).
2. In the dialog box, type the Source Host Name in the edit field.
3. Press the Source Depot Path button—it's not just a label.
4. In the dialog box that pops up, select from the list of registered depots on that host.
5. Press OK to use that remote depot.

Another way is to use the *swlist* command line to tell you what depots are registered on that host:

```
# swlist -l depot remsys
```

where *remsys* is the name of the remote system on the network containing one or more depots in directories.

I would like to credit the HP 10.0 Field Review Team for many of the answers here.

Bill Hassell is a support engineer at the HP Atlanta Response Center. He is the author of the forthcoming book, The HP-UX System Administrator's Survival Guide, a Hewlett-Packard Professional Book published by Prentice Hall. He can be contacted via e-mail at blh@hpuerca.att.hp.com.

Workstations

Q: I just received the latest update for BASIC/UX, RMBUX 6.4, to run on my HP 9000 Series 382 CPU. I am currently running BASIC/UX 6.3 with BASIC PLUS A.01.00. Is BASIC PLUS A.01.00 supported with BASIC/UX 6.4? The BASIC PLUS media says that it will work with BASIC/UX 6.2 and 6.3.

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CIRCLE 185 ON READER SERVICE CARD

A: BASIC/UX 6.4 requires BASIC PLUS A.01.01, which will work with BASIC/UX 6.4 and 6.3.

Q: I am running MPOWER 2.02 on my HP 9000 Series 725 computer. My problem is that since I installed MPOWER, every time I log in, a FAX 9000 window pops up on my screen. I then close the FAX 9000 window and I always make sure that the FAX 9000 window is closed before I exit VUE to try to prevent this behavior, but it doesn't help. Why am I seeing this behavior and how can I prevent it?

A: You are seeing this behavior because of the manner in which you close the FAX 9000 window. There are two ways to close the FAX 9000 window. The first way, which is responsible for the behavior you are seeing, is to use the close button in the lower right side of the FAX 9000 widget. This button causes the VUE window manager to unmap the FAX 9000 window. The unmapped window is still managed by the window manager and is still in memory but not seen by the user. The reason for this is so that the server process can still run in the background and the FAX 9000 window can be brought back up much quicker. Allowing the server process to run in the background also enables it to update the FAX 9000 icon on the VUE dashboard panel when a fax is received, to notify the user. Now when you log out, the HP VUE window manager treats this unmapped window like any other window on the

screen and its presence is noted in the *.vue* directory session file so it can be restored the next time you log in. This is why the FAX 9000 window pops back up when you log back into your workstation after running the FAX 9000 product.

The second method of closing a FAX 9000 window is to use the "exit" option under the "Composition" menu in the upper left corner of the FAX 9000 window. When you close the window through the "exit" option, a widget pops up to explain that exiting FAX 9000 will cause the application to terminate and notification of new faxes will not occur. If you close the FAX 9000 window in this way, the fax window is removed from the window manager and when you exit VUE there are no unseen windows that will be remapped with the next login.

As I mention above, the second method will prevent the behavior you are seeing at login. There is one other choice as well: if you set up a VUE "Home session" without the FAX 9000 software running and select to restore the home session during login, you can prevent the window popping up at login. However, this method will also prevent the software from notifying the user of new faxes received if fax is not started.

Q: I have an HP 9000 Series 745i machine running HP-UX 9.03 on which I installed your Standard Instrument Control Library software. The SICL software version is B.02.03e. I developed an application that collects data from a rack of instruments and logs the data to the screen as well as to some files in which I archive the data that I want to keep. However, intermittently I get the following error logged to the root window:

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```
pil: fatal error hps745 internal error detected with DMA
```

The error does not seem to have any adverse effect on the way my application runs but it is a nuisance. Should I be concerned over this error? Is there any way to stop the error?

A: The error is erroneous and can be disregarded. To correct the intermittent logging of this error to your root window, you will need to update to the B.03.06a version of SICL, which is the currently released version of the Standard Instrument Control Library.

Q: I am running HP-UX 9.05 on an HP 9000 Series 712 workstation with an HP TeleShare board and software installed. The TeleShare documentation states that you should be able to access the data modem on board the TeleShare card through the HP-UX *cu* command when TeleShare setup scripts configure a TeleShare port for data. I ran `/opt/teleshare/bin/setup_teshare` and selected data mode for the teleshare line 2. I then tried to execute the *cu* command as outlined in the TeleShare manual troubleshooting section as follows:

```
cu -l /dev/tsdata_direct1 dir -s 19200
```

This command only returned an error saying it could not find the device. Is the manual correct—can I use the *cu* command with the TeleShare data modem and is there some configuration that I am missing?

A: Yes, the TeleShare data modem does support using *cu*. You will also need to edit the `/usr/lib/uucp/Devices` file and add the following lines at the bottom of the file:

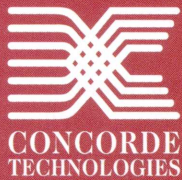
```
ACU tsdata_direct0 - 19200 hayes (for line 1)
ACU tsdata_direct1 - 19200 hayes (for line 2)
```

Then you should be able to access line 2 through the following command line:

```
cu -l /dev/tsdata_direct1 -s 19200 <phone number>
```

Q: I run BASIC/UX 6.3 on HP-UX 9.03 on the HP 9000 Series 300 and BASIC/UX 7.1 on HP-UX 9.05 on an HP 9000 Series 700 workstation. I am developing code that I will run on both platforms and would like to know if it is possible to read HP-UX environment variables through a BASIC/UX session.

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CIRCLE 55 ON READER SERVICE CARD

A: Yes, to do this you would need to use an inbound pipe from HP-UX to BASIC/UX. The following sample code shows how this is done. Assume that at login your environment has a *DISPLAY* variable that is set to *slim:0.0* and exported.

```
10 DIM A$(10)
20 ASSIGN @Pipe TO "echo $DISPLAY |"
30 ENTER @Pipe;A$
40 PRINT A$
50 END
```

The short code above when executed in BASIC/UX will print "slim:0.0" to the BASIC/UX screen.

Q: I would like to know if it is possible to change the default font used by BASIC/UX. I run BASIC/UX 7.1 on an HP 9000 Series 745i running HP-UX 9.05.

A: Yes, this can be done through the *-fn* option to the *rmb* command as follows:

```
rmb -fn hp8.8x16 (where hp8.8x16 is an rmb-supported font)
```

This can also be accomplished in a more seamless manner by editing the

/usr/lib/X11/app-defaults/Rmb file. Look for the following line to uncomment or add:

```
Rmb*font: hp8.8x16
```

If this file does not exist, simply copy the template file */etc/newconfig/rmb/Rmb* to the */usr/lib/X11/app-defaults* directory and edit the template. A table of the fonts supported by BASIC/UX 7.1 is documented in the *Installing and Maintaining HP BASIC/UX* manual. ■

Rudy Stanley is an applications support engineer with the Hewlett-Packard Response Center in Atlanta, Georgia. He can be reached via e-mail at: brst@hpuerca.atl.hp.com.

Keeping Log Files Under Control

I HAVE FOUND THAT THE most overlooked disk space hogs on an HP-UX system are the log files created by the core OS daemons. By default most of these log files grow without bound until they are manually trimmed (usually while looking for disk space!). HP-UX does clean up some log files when it boots, but not all, and especially not the ones that get big fast!

In this month's column I will present a list of the files you will need to trim and a strategy for automatically trimming them using *cron*.

ASCII Log Files

If you start *sam(1M)* and look at the list of files under the Routine Tasks→Disk Space Recovery→Log File Trimming→ASCII Log Files menus, you'll see most of the files that you will need to monitor. The table lists the files, the actual size, and the recommended size. Using the Actions menu you can manually trim the files you want.

The only problem with this strategy is that you must run *sam* by hand each time you want to trim the files. An easier way is to use *cron* to trim them at a fixed interval.

The first step in developing a strategy for trimming your log files is to find them all. First look for the obvious ones: Anything that ends in *log*. The following command will find all the files that end in *log* and list them in a file:

```
/etc/find / -print -name "*log" > /tmp/admin.files
```

When the command finishes, a list of possible log files is in */tmp/admin.files*. (You may want to run this command at night or with a low priority since it looks at the name of every file in your system.)

Next edit the */tmp/admin.files* file and remove the file names that are not log files. Some are obvious; in my case the software I work with has several log files that it automatically cleans up. For the ones you are not sure about, look at the contents of the files, use *laserROM* to search for the file name, or ask the vendor who supplied the software.

Next obtain a list of all the third-party software installed on your system. Look at the documentation to see what log files are created and how they are maintained, or call the vendors and ask. Several of the packages I use have log files that I must trim.

Finally compare your list against the list that *sam(1M)* provides. You will probably find several on your list that *sam* does not have and vice versa. The following is the list of ASCII files from my system:

```
/etc/ptydaemonlog
/usr/lib/cron/log
/usr/lib/cron/OLDlog
/usr/lib/powerchute/powerchute.log
/usr/adm/shutdownlog
/usr/adm/rld.log
/usr/adm/snmpd.log
/usr/adm/syslog
/usr/adm/OLDrld.log
```


LISTING 1 *Trimming Log Files*

```
#!/bin/ksh
#
#
function trim_logs
{
    mask=`umask`
    umask 022
    #
    # Copy the log file to and OLD version then truncate the original
    #
    for FILENAME; do
        mv $FILENAME $FILENAME.OLD
        > $FILENAME
    done
    umask $mask
}

function trim_sulog
{
    #
    # Trim the sulog file. This one is special because the contents
    # contain security information
    #
    mask=`umask`
    mv /usr/adm/sulog /usr/adm/sulog.OLD
    /usr/bin/mailx -s "sulog" root < /usr/adm/sulog.OLD
    umask 077
    > /usr/adm/sulog
    umask $mask
}

function trim_login_files
{
    #
    # Trim the non-ASCII log files,
    #
    mask=`umask`
    #
    # mail the list of last bad logins to root, then trim the file
    #
    /etc/lastb | /usr/bin/mailx -s "Last Bad Logins" root
    > /etc/btmp
    #
    # Fix-up the contents of /etc/wtmp, convert it to ASCII and save
    # the last 50 entries
    #
    /usr/lib/acct/wtmpfix /etc/wtmp | /usr/lib/acct/fwtmp > /tmp/wtmp.ascii
    tail -50 /tmp/wtmp.ascii > /tmp/wtmp.new
    > /etc/wtmp
    /bin/cat /tmp/wtmp.new | /usr/lib/acct/fwtmp -ic > /etc/wtmp
    /bin/chmod 664 /etc/wtmp
    #
}
```

Continued on Page 18

LISTING 1 *Trimming Log Files, continued*

```

# Clean-up
#
rm /tmp/wtmp.ascii /tmp/wtmp.new
umask $mask
}
#
#
# Mail the current contents of a couple of files to root
#
/usr/bin/mailx -s "Syslog" root < /usr/adm/syslog
#
# Shutdown the print spooler
#
/usr/lib/lpshut
#
# Trim the ASCII log files, keeping a copy of the existing log file
#
trim_logs \
/etc/ptydaemonlog \
/usr/lib/cron/log \
/usr/lib/powerchute/powerchute.log \
/usr/adm/shutdownlog \
/usr/adm/rld.log \
/usr/adm/snmpd.log \
/usr/adm/syslog \
/usr/adm/rbootd.log \
/usr/adm/sulog \
/usr/spool/mqueue/syslog \
/usr/spool/lp/log \
/usr/sam/log/samlog \
/usr/sam/log/regen.log \
/usr/sam/log/reboot.log \
/usr/lib/spell/spellhist \
/usr/spool/uucp/.Log/uucico/wittsend \
/usr/spool/uucp/.Log/uucp/wittsend \
/usr/spool/uucp/.Log/uux/wittsend \
/usr/spool/uucp/.Log/uuxqt/wittsend
#
# Restart the print spooler
#
/usr/lib/lpsched
#
# Trim the sulog
#
trim_sulog
#
# Finally trim the login files
#
trim_login_files

```

```

/usr/adm/OLDsyslog
/usr/adm/rbootd.log
/usr/adm/sulog
/usr/adm/OLDsulog
/usr/spool/mqueue/syslog
/usr/spool/lp/log
/usr/spool/lp/oldlog
/usr/sam/log/samlog
/usr/sam/log/regen.log
/usr/sam/log/reboot.log
/usr/lib/spell/spellhist
/usr/spool/uucp/.Log/uucico/*
/usr/spool/uucp/.Log/uucp/*
/usr/spool/uucp/.Log/uux/*
/usr/spool/uucp/.Log/uuxqt/*

```

The last four are masks for several files. The */usr/spool/uucp/.Log* directories contain a log file for each site you have connected to via UUCP. If you have a very active mail feed or receive your Usenet news via UUCP, these files will get large quick.

The *powerchute.log* file is for my UPS monitoring system. You may have something similar if you use a UPS system. One file not in the list, but one that I trim, is for my *sudo*-like program. Since the log file is named after the program, I don't want to advertise the name for security reasons. (*sudo* and its relatives give root permission to specific users. These users either have total root permission or limited commands they can execute. Even though the permissions and users are restricted, why advertise the command name, in case someone breaks in as a normal user?)

So what to do with these files? You'll notice that there are pairs of files named OLDsomething and something. The OLDsomething file is usually created from the last something file when the system is booted. So typically you leave the OLDsomething files alone.

Several of these log files you may want to view at a regular interval. For example the *su*log file contains a list of all users who used the *su* command to become another user. A careful review of the contents of this file can tell you who knows other users' passwords or root's password.

Trimming Non-ASCII Log Files

There are two primary non-ASCII log files the HP-UX operating system generates: */etc/wtmp* and */etc/btmp*. The */etc/wtmp* file contains a list of all successful logins and the */etc/btmp* file contains a list of all unsuccessful login attempts. A third file, */etc/umtmp*, contains information about the currently logged-in users and should NEVER be touched.

HP-UX provides two programs for manipulating these files. They are */usr/lib/acct/fwtmfix* and */usr/lib/acct/wtmfix*. These programs are part of the ACCOUNTING fileset, but you do not need to be running any form of HP-UX's accounting system to use them.

The *wtmfix* program looks at the contents of the supplied file and fixes any problems with the contents of the file because of date/time changes or booting of the system. The *fwtmfix* program accepts the contents of one of the files as standard input and outputs an ASCII version of its contents. *fwtmfix* can also be used to rewrite a binary file. The *trim_login_files* function described in the next section uses these commands to trim these files.

Scripts for Trimming Logfiles

I trim my log files weekly. Since I keep a copy of the most current log file, I have two weeks' worth of data to look at when diagnosing a problem. The script in Listing 1 is called via *cron* once a week

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CIRCLE 40 ON READER SERVICE CARD

to clean up my log files.

You may receive mail from *cron* because of messages sent to standard out or standard error if some files do not exist or if there have not been any bad login attempts since the last time the script was run.

I want to thank several members of the HP-UX System Administration mailing list for their help with the */etc/wtmp* and */etc/btmp* log trimming function:

Ben Klein (bklein@pel.com)

Brett E. Wright (bwright@hp7004.ecae.stortek.com)

Frank Wales (frank@arcglade.demon.co.uk)

Fred Gansevles (Fred.Gansevles@cs.utwente.nl)

Bernd Nebendahl (b.nebendahl.physik.uni-stuttgart.de)

Thanks for the e-mail about the column, and please keep the suggestions for topics coming! ■

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SD for HP-UX 10.0

by Bill **Part 1** Mulaney

The New Business Release (HP-UX 10.0) in February of 1995 introduced a number of significant changes to HP-UX. Two of the biggest changes are the move from the traditional HP-UX directory structure to the SV.4 file system layout, and the move away from the proprietary HP-UX diskless implementation (DUX) to a more industry-standard implementation based on NFS. The software utilities used for installing and managing the operating system software have also undergone a major change.

This two-part article explores the use of HP OpenView Software Distributor (SD) as the supported Software Management toolset for HP-UX 10.0 and the future. Part 1 introduces concepts that are new with SD to the experienced HP-UX system administrator and gives some development history and design rationale. Where applicable, it gives parallels to previous software administrative

steps, showing improvements over former utilities. Part 2, appearing in the next issue of *hp-ux/usr*, will provide some examples of SD command syntax for a few common situations.

The change in software installation tools is immediately obvious to the administrator who has used */etc/update* to install software on HP-UX systems. But SD is much more than a revised */etc/update* command. On the HP-UX 10.0 release, SD provides a complete toolset for all essential software management operations on the local system. Using SD, the system administrator controls the initial installation and configuration of HP-UX system software, and the updating of software that is already installed. SD also provides post-installation software management capabilities such as listing, verifying, and removing installed software. In addition to managing HP-UX system software, SD allows software developers to package and distribute their own

software. Using SD, developers can list, verify, modify, and control access to software being distributed. These capabilities are all an integral part of the new HP-UX. Beginning with HP-UX 10.0, they are delivered as a standard component of HP-UX and at no additional cost.

Why Replace *etc/update*?

Customer demand was the force propelling the change toward SD and away from */etc/update* and its associated commands.

Customer surveys consistently returned requests for more capable, more automated software management tools, not merely a fancier installation toolset. In those surveys, customers asked for added flexibility and functionality for listing installed software: the ability to list the files in any fileset, to show its revision, install date, dependencies, description of its contents, and so on. They asked that installed software names match

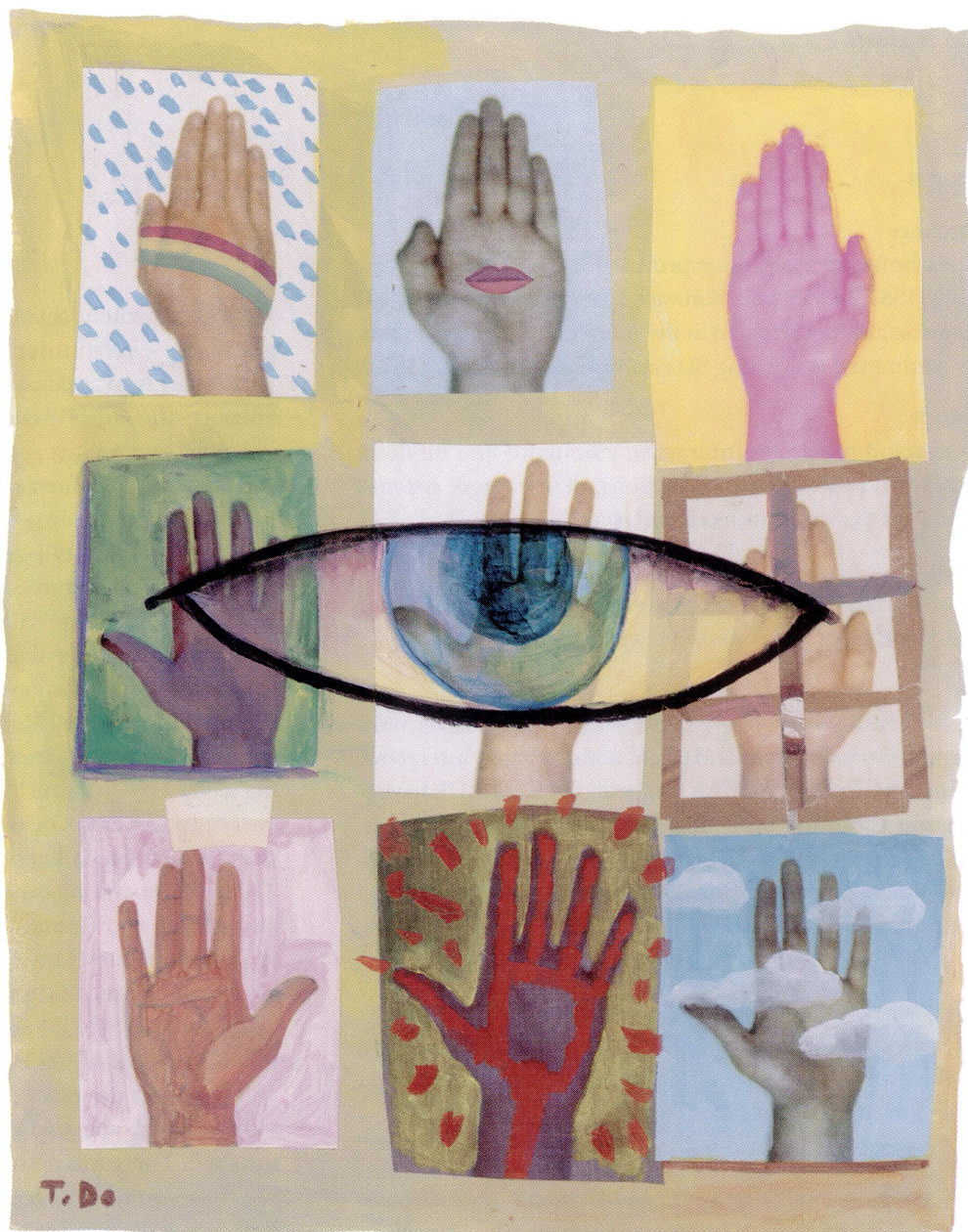


Illustration by Thien-Do

the names appearing on the Corporate Price List. Customers wanted ways to verify the integrity of software they had installed. They wanted to pre-view significant software management procedures before actually affecting the system. Customers wanted more options to control default behavior and to override error conditions.

Many customer requests resulted in changes to `/etc/update`, `/etc/rmfn`, `/etc/fpkg`; other changes could not be

done without a large redesign effort.

In the early stages of the HP-UX 10.0 development effort we, the design team responsible for HP-UX 10.0 software management, realized there would be sweeping changes to the fundamental structure of HP-UX. Those changes would require correspondingly significant changes to the software installation commands. However, making those changes also gave an opportunity to accomplish many of the improvements customers

had asked for. But we could no longer offer a loose aggregate of similar, discrete commands. We had to deliver a cohesive set of software management tools. Rather than modify the existing commands, we decided that it was in the customer's best interest to adapt a more current, capable toolset to HP-UX. (See the sidebar entitled Software Management Before SD.)

Such a toolset already existed: HP OpenView Software Distributor. Introduced in July 1993 to provide centralized soft-

Major SD-OV Features

■ Standards Conformance

HP OpenView Software Distributor provided the base specification for the POSIX 1387.2 Electronic Software Distribution standard. SD engineers have actively participated in the refinement of the standard. HP is firmly committed to keeping SD conformant to POSIX 1387.2.

■ Command-Line Mode

Each SD command has a non-interactive command-line mode in which the user can make software selections, define target systems, specify options, set the verbosity level, and so on.

■ Command Options

Each SD command has a rich set of options that can be used to define the command's behavior when runtime decisions must be made.

■ Motif-based GUI

In addition to their non-interactive command-line mode, the *swinstall*, *swcopy*, and *swremove* commands have a Motif-based interactive Graphical User Interface. The GUI is similar to the SAM GUI, having a five-item menu bar at the top, a message area, and an object list. Figures 2 and 3 show two of the GUI screens for the *swinstall* command. Figure 2 shows the software description screen and Figure 3 shows the interactive software selection screen.

■ Extensive Analysis

Software installation, updating, removal, packaging, and depot copying have an analysis phase in which the effects of the operation are evaluated before any changes are made. A failure predicted in the analysis phase prevents continuation.

■ Preview Mode

The *swinstall*, *swcopy*, *swconfig*, *swremove*, *swpackage*, and *swmodify* commands can be previewed without actually performing the operation. With this feature the user can detect errors and view the effects of the proposed operation.

■ Requisites

Software Distributor has two classes of requisites: a "corequisite" is a run-time dependency; a "prerequisite" is an install-time dependency.

■ Control Scripts

Delivered software can include vendor-provided shell scripts. They enhance the generic installation, configuration, verification, and removal management processes by performing fileset-specific actions at specified places in the process.

■ ACL-based Security

Access Control Lists (ACLs) are used to control administrative access to installed software and to software depots.

ware management capability in heterogeneous environments, Software Distributor is an application that greatly enhances the ease of client system administration from a single, central point on the network. Customer response to SD has been consistently positive. (See the sidebar Major SD-OV Features.)

Despite all its features, HP OpenView Software Distributor (SD-OV) did not at that time have the ability to install or update the core components of an HP-UX operating system. Missing in SD-OV were essential capabilities such as building a new HP-UX kernel, rebooting the system to the new OS, and restricting the installation of licensed software. There was no interactive user interface for ASCII terminals and for non-graphics consoles. Other, non-vital, yet very important features were also unavailable in SD-OV: smooth integration with the HP-UX cold install process and the ability to select easily only that software which matched software already installed. There was no software grouping that would allow correspondence between software on the Corporate Price List and software found on the system after installation.

Using Software Distributor was a clear choice. It was also clear that changes were needed to make it as complete a tool for managing HP-UX operating system software as it is for managing application software. Those changes comprise Software Distributor on HP-UX (SD-UX).

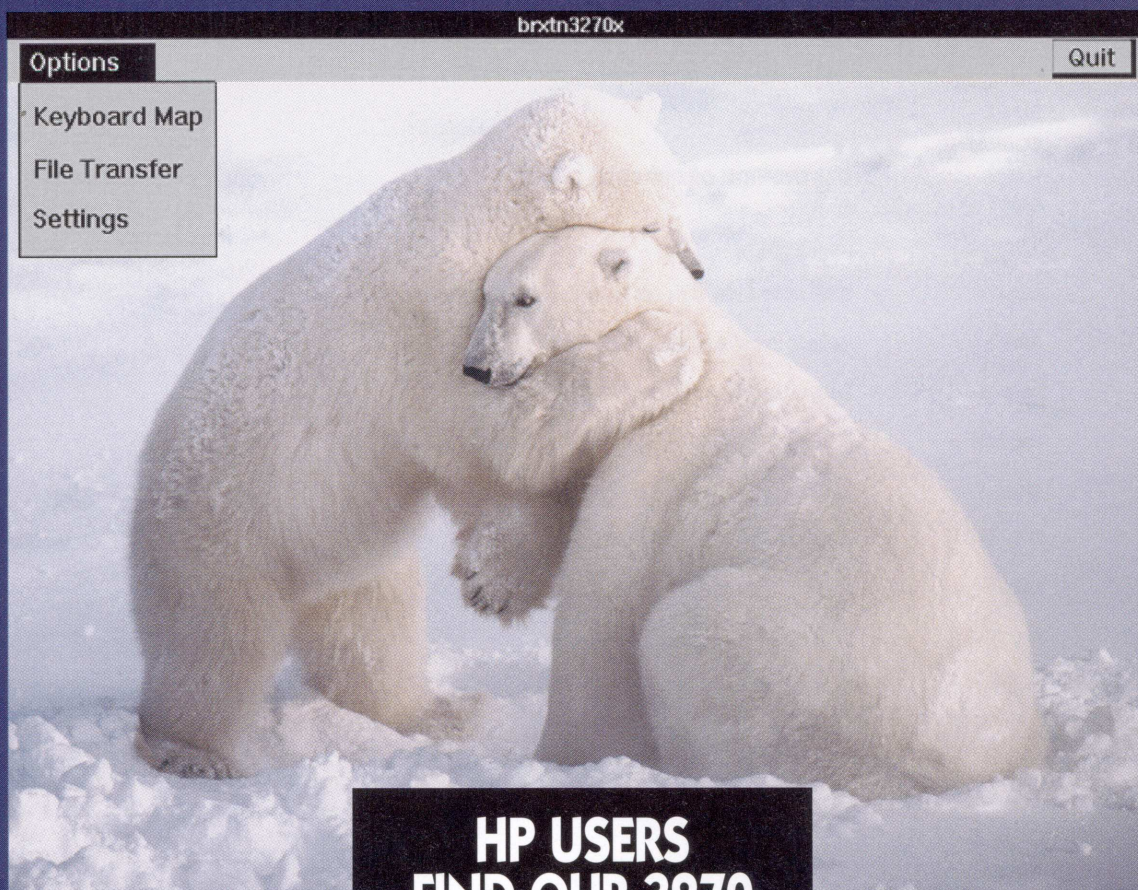
Concepts Carried Forward from /etc/update

Fundamental software management operations such as installing, configuring, removing, packaging, and copying are essential to system administration.

Continued on Page 26

Continued on Page 24

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TABLE 1

Comparing /etc/update and SD-UX Commands and Concepts

/ETC/UPDATE COMMAND NAME	SD-UX COMMAND NAME	DESCRIPTION OR PURPOSE
Software Management:		
<i>update</i>	<i>swinstall</i>	Install software from media onto the system. Update software already installed
N/A	<i>swconfig</i>	Configure (unconfigure) installed software
<i>rmdir</i>	<i>swremove</i>	Remove installed software from the system
N/A	<i>swagentd</i>	Daemon which responds to service requests from other SD commands
N/A	<i>swagent</i>	Process spawned by <i>swagentd</i> to service an SD command
N/A	<i>swmodify</i>	Change the contents of the IPD
N/A	<i>swlist</i>	Show information on installed or served software
N/A	<i>swverify</i>	Check integrity of installed or served software
N/A	<i>swcluster</i>	Install software for use by an NFS diskless client system
Software Access Control:		
N/A	<i>swacl</i>	View and modify user access privileges
Software Packaging and Distribution:		
<i>fpkg</i>	<i>swpackage</i>	Package software for distribution
(PSF)	(PSF)	Product Specification File
<i>netdistd</i>	<i>swagentd</i>	Daemon process
(netdist server area)	(depot)	Directory hierarchy dedicated to software being served for installation
<i>updist</i>	<i>swcopy</i>	Copy a software distribution area
N/A	<i>swreg</i>	Register a depot for distribution

The command names in SD-UX have changed, as *Table 1* shows, but the basic concepts have been carried forward.

Many details have been carried forward, too. The fundamental software unit is still called a "fileset." Dependencies among filesets are supported. Filesets containing kernel components are treated specially. Information on installed software is kept on the system. The user can easily select the software components that match filesets already installed. Filesets include scripts that do auxiliary installation and removal operations. Software is packaged into a directory

structure from which it is distributed to clients over the network. A single system can serve software to multiple clients.

Filesets

The fileset is the only SD software organizational unit that has a direct precedent. A fileset has its own unique set of installable system files, its own control scripts, and its own set of attributes. Some of the attributes unique to the fileset are its name, description string, revision number, requisites, and whether it is a kernel fileset or a reboot fileset.

Requisites

SD defines two classes of requisites. A "corequisite" is the term for a run-time dependency: a fileset needs another fileset present on the system in order to run correctly. This dependency concept existed in */etc/update*.

SD introduces the concept of a "pre-requisite" as an install-time dependency: a fileset needs another fileset to be already present on the system in order for the installation to succeed.

A fileset's requisite can point to another fileset or to an entire product. It can also specify a particular revision or

range of revisions of the requisite software. SD sequences software installation so that prerequisites are installed before the filesets that depend on them. Corequisites do not affect the install order.

Kernel Filesets

Filesets that contain kernel components play their most significant role when updating the core HP-UX operating system. The kernel filesets must be loaded onto the system as early in the installation process as possible—before any non-kernel software. This is so a kernel build can be attempted as soon as possible. Success in building the new kernel is a watershed event when updating an HP-UX system from one major release to the next. If the kernel build succeeds, the other software can be loaded. If the kernel build fails, it is unsafe to proceed with the rest of the operating system update: newly installed commands might not be compatible with the old kernel and the system could be partly unusable, or, in the worst case, unbootable.

Like */etc/update*, SD-UX loads kernel filesets (and their prerequisites, whether kernel filesets or not) before loading non-kernel filesets.

Kernel Building

Kernel build processes have been unified on HP-UX 10.0; all distinctions between Series 700 and Series 800 build processes have been eliminated. *genfiles* and *dfiles* have been combined into the file */stand/system*. The structure of the *system* file contains no architectural distinctions. The locations of the kernel libraries and header files are now identical for both architectures. The set of commands used to build a kernel and the interface to them have also been unified. Although the contents of the resulting kernel might be architecturally distinct because of some residual differences, the user steps for building a kernel are now identical.

Rebooting

The OS update process now requires only one system reboot. SD-UX allows a distinction between kernel filesets and reboot filesets. Each is specified by a discrete fileset attribute. A fileset might be a reboot fileset, meaning that its installation requires a system reboot, without it containing a kernel component. This separation also allows for the possibility of a kernel fileset whose installation does not require a system reboot. For the present, SD-UX kernel filesets are all specified to be reboot filesets.

Major SD-OV Features, continued

■ Remote Management *

From a central administration point, a system administrator can manage software on systems across the network. Software “push” capability allows installation, removal, configuration, listing, and verification on remote target systems.

■ Multiple Destinations*

Software can be installed simultaneously to many target systems with a single invocation of the install controller.

*The Remote Management and the Multiple Destinations features are not offered in SD-UX. Like */etc/update*, the SD-UX toolset operates only in “pull” mode: the target system must be the one on which the SD command is invoked.

Installed Product Database

The Installed Product Database (IPD) contains information about software installed by SD. It is located under */var/adm/sw/products*, and replaces the contents of the */system* and the */etc/filesets* directories. SD cannot read information about software installed by */etc/update*, and vice versa.

Match What I Have

A common scenario when updating the HP-UX operating system is to select only software that matches what is already installed on the system. Match What I Have (MWHI) capability is offered in SD, and can be applied to any software fileset, not just to core OS filesets. Prior to HP-UX 10.0, the fileset name mapping was hard coded into */etc/update*, a practice that tied */etc/update* to a particular OS release revision. A more general implementation, in which the software package developer specifies the predecessor(s) for each fileset, is available in SD.

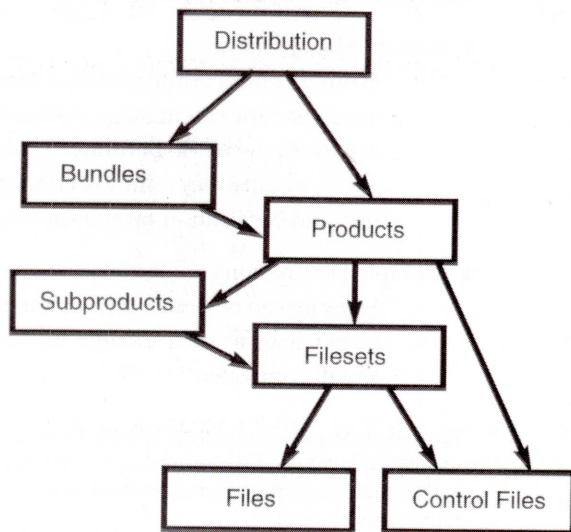
Control Scripts

SD offers more scripts than just the *customize* script that was invoked by */etc/update* and the *decustomize* script invoked by */etc/rmfu*. They are described later.

Depot

The former “netdist server area” is now called a “software depot.” A depot is a structure of directories located under a single root directory; the depot’s name is the path of that root directory. The number of depots a system can support is limited only by that system’s disk space and performance.

Continued on Page 26

FIGURE 1 Software Groupings

Software Management Before SD

Previous releases of HP-UX accomplished software management tasks using several discrete commands. All software installation—initial installation, reinstallation, and updating—was accomplished with the `/etc/update` command. It dealt with functional groupings of files called “filesets” and with “partitions,” a grouping of filesets that did not directly correspond to products as customers understood them. Each fileset had a set of overhead files that contained information such as the fileset’s contents and attributes. Other overhead files included shell scripts that performed fileset-specific install-time and remove-time processes. `/etc/update` featured a command line mode for non-interactive invocation and also a simple, interactive ASCII terminal user interface that made use of user-defined soft keys.

Software removal was accomplished with the `/etc/rmfn` command, which, like `/etc/update`, dealt in units of filesets and partitions. `/etc/rmfn` had both a non-interactive command line mode and an interactive mode similar to that of `/etc/update`.

To create software media for use with `/etc/update` a developer first created a Product Specification File (PSF) containing the name, contents, and other attributes of each fileset. The developer then invoked `/etc/sfpkg` to create the media, which could be either magnetic media or a “netdist server area.”

A netdist server area referred to a uniquely structured directory hierarchy containing files that could be distributed over the network to client systems. The `/etc/netdistd` daemon would respond to a connection request from a client system running `/etc/update`.

The `/etc/updist` command copied a netdist server area from one server system to another.

The depot has two main components: the installable files and the catalog. Installable files that make up each fileset are contained in a subdirectory hierarchy that is based on product structure and names and fileset names. A “catalog” directory consists of subdirectories that are also derived from product and fileset names. They contain files with software structure and attribute information. Control scripts are also under the “catalog” directory.

Concepts New with SD

Daemon and Agent

The SD daemon, `/usr/sbin/swagentd`, is launched at system startup. It responds to requests from SD commands originating either on the host system or across the network. It spawns an agent process dedicated to serving the requester. The agent process does all the work of selection, analysis, execution, and status requests.

Software Groupings

SD-UX introduces some new software structural groupings: “products,” “subproducts,” and “bundles.” Each is a superset of the software “fileset” structure. (see Figure 1.)

Products

Products are groups of filesets. They do not correspond to the partitions that `/etc/update` used. A fileset can be contained in only one product. A product has its own set of filesets, its own control scripts, and its own set of attributes. Some product attributes include its name, description string, revision (not necessarily identical to the revision string of the included filesets), the name of the OS for which

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Completeness	"We only back up our PC servers. We don't worry about data on users' PCs."	"Plan-B backs up all our PCs and PC servers, or whichever PCs we specify."
Automation	"Users perform their own backups. We give each one a box of floppy disks and they come to us when they need more."	"We used Plan-B's scheduler to automatically back up our PCs to our HP9000's DDS drive at night."
Convenience	"We have someone who comes in at night and carries a Trakker to each PC and backs them up one-by-one during the night. Users fill out a form if they need a file restored, and our night person restores the file."	"Plan-B backups are done with no user or operator intervention. The PC data is written to tape as part of our HP9000 backup. Users have a program on their PCs which they use to restore any file, any time, in seconds."
Control	"Users are supposed to back up their own PCs. We tell them to put important files on the file server anyway."	"Plan-B meets our auditor's requirements for ensuring that all corporate data is safeguarded."
Integrity	"We are not concerned about data consistency between PCs and the HP9000. Our client/server applications have not been implemented yet."	"Plan-B is the only backup package we found that supports our client/server environment, in which interrelated data is contained on PCs and the HP9000."
Security	"Users keep their backup diskettes in their desk drawers."	"With Plan-B, our PC backups are as reliable and secure as our HP9000 backups."
Performance	"PCs with large disk drives can take a very long time. We tried doing a PC network-based backup but it was way too slow."	"Plan-B's speed blows everything else away, since it uses the horsepower of our HP9000 system and backs up multiple PCs concurrently."

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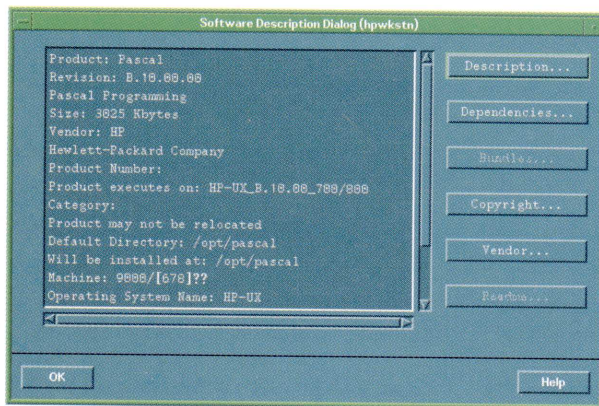
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FIGURE 2



product plus additional filesets containing enhanced functionality such as a GUI. A “Manuals” subproduct contains all manual pages pertaining to the product. A “Development” subproduct delivers header files and libraries for developing applications based on the product’s functionality. A “Demonstration” subproduct contains executables and data for demonstrating the product’s features. A subproduct has no attributes other than its component filesets.

Bundles

A bundle is a software packaging unit made up of products and filesets that corresponds to a discrete, orderable item on the Corporate Price List.

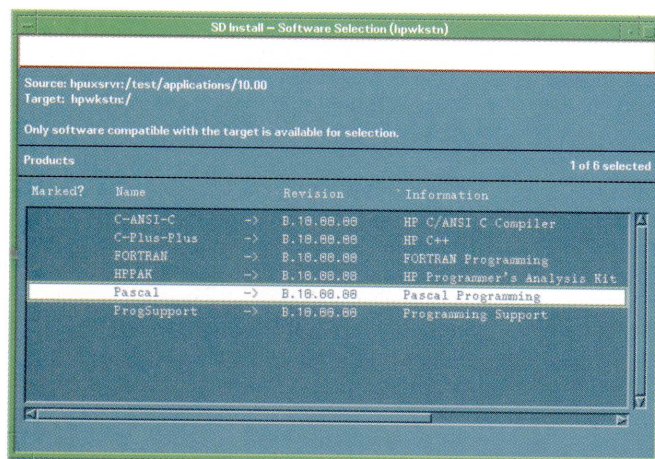
For example, a bundle such as “HPUXNorGS800,” the Norwegian Runtime HP-UX Environment Bundle, includes the basic HP-UX operating system for Series 800 systems, the full X11 run-time environment, and Norwegian message catalogs. A bundle such as “HPUXEngDT700,” the English HP-UX Desktop Environment Bundle, includes the basic HP-UX operating system for Series 700 workstations and an X11 run-time environment. A bundle can define a purchasable configuration enhancement such as “B3919AA_AGS,” the HP-UX Unlimited-User License for Series 800. It can also define a purchasable subsystem such as “92668A,” the software for Switchover/UX.

Bundle components are not necessarily unique to that bundle. Products and filesets can be components of more than one bundle.

Command options

Unlike */etc/update*, SD allows the user to give one or more options on the command line and still use the Graphical

FIGURE 3



the product was developed, the architecture for that OS, the release revision of that OS, the directory under which that product’s files are installed by default, the names of the product’s filesets, and whether that product’s files can be relocated (installed under a directory other than the default). Figure 2 shows the GUI’s software description screen, which displays the selected product’s attributes.

Subproducts

A subproduct is a subset of a product, and can be selected as a unit. It contains one or more filesets defining a logically related, functionally complete unit. Filesets within a product can be part of more than one subproduct. Subproducts such as “MinimumRuntime” will contain the least number of filesets necessary to run the product’s software. A “Runtime” subproduct typically contains all the filesets in the “MinimumRuntime” sub-

User Interface. Options and values specified on the command line are passed to the GUI.

For each SD command invocation, the values assigned to its options can come from five possible sources. In order of increasing priority they are:

- Each command option has a default value encoded into SD.
- Option values that apply to all users on the system are contained in the file `/var/adm/sw/defaults`. Options not changed by the contents of this file retain their default values.
- Each user can specify a set of personal option values in the file `$HOME/.sw/defaults`. Options not changed by the contents of this file retain their values.
- Option values can be provided by the user on the command line.
- Option values can be set interactively by the user in GUI mode.

The two levels of *defaults* files described above are optional. There is no error if either file is absent, or if its contents do not define a value for a particular option.

SD-UX Commands

The following commands comprise SD-UX. The full complement of options for each command isn't given here because they are too numerous. The "host system" or "target" refers to the system on which the command is executed since SD-UX operates in "pull" mode only.

Commands that act only on system software:

swinstall

Install software from a source to the host system. By default, software configuration is performed automatically after installation.

swconfig

Configure software installed onto the host system. The "u" option unconfigures system software that is already configured.

swcluster

Install software on an NFS Diskless cluster server to make it available to NFS client systems.

Commands that can act on installed system software and also on software contained in a depot on the host system:

swverify

Check the integrity of the software.

swremove

Remove software. System software is unconfigured before removal.

swlist

Display software information. The software to be listed can be installed on the system, in a depot on the host system or a remote server system, or on SD media.

swmodify

Change data in the system's Installed Product Database or in a depot on the host system. *swmodify* cannot alter system files or depot files.

swacl

View and modify user access privileges for a software object.

Commands that aid in packaging and distributing software:

swpackage

Create software distribution source media, either a depot or magnetic media.

swcopy

Copy software from source media to a software depot.

Registration of the resultant depot is done automatically.

swreg

Register a depot newly created by *swpackage* to make it visible to other systems. The "u" option unregisters a depot that is already registered.

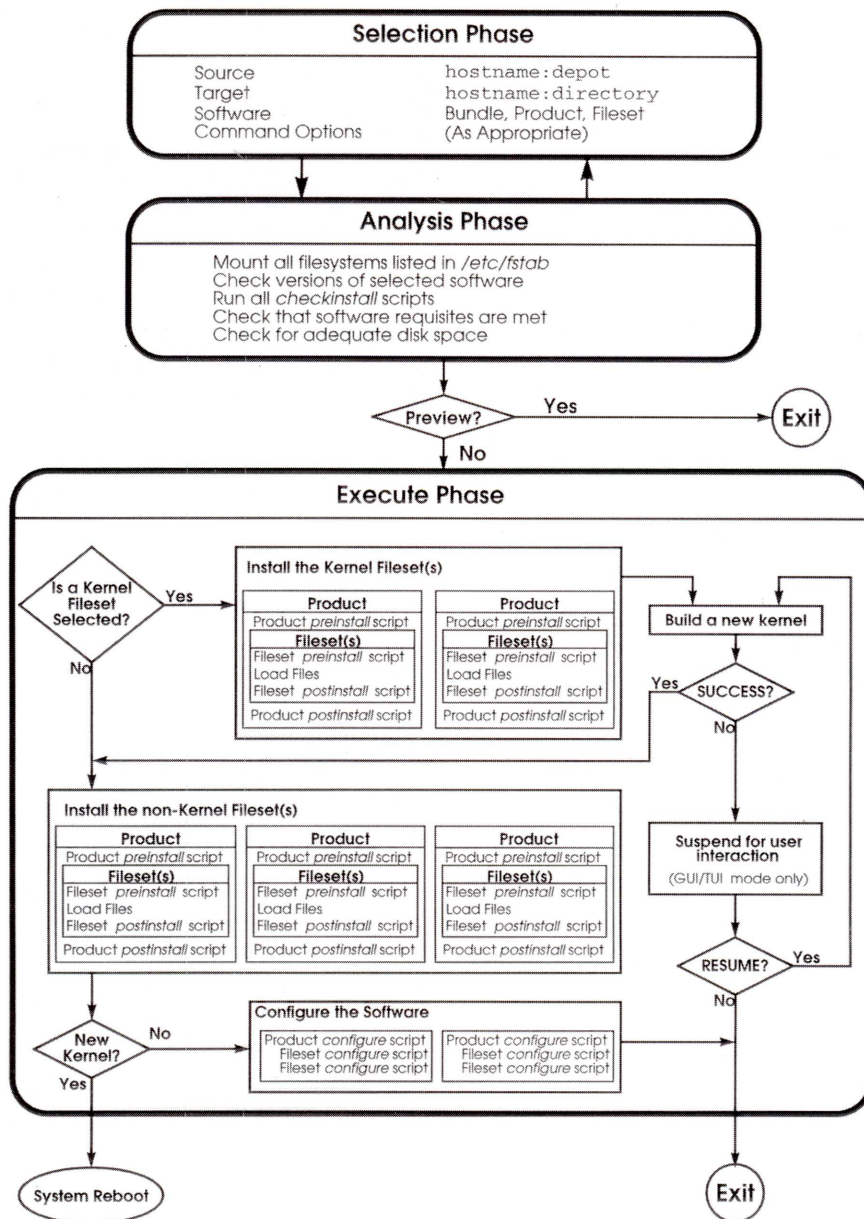
Control Scripts

Because software installation is seldom as simple as placing files on a system, auxiliary installation steps are often required. Such steps include:

- Performing actions based on conditions that can be determined only at install time.
- Moving or copying a file after it is installed.
- Changing a file's contents to reflect a system-specific condition.
- Changing a file's attributes.

With `/etc/update` a "customize" script associated with each fileset was run after filesets were installed. There was also a "decustomize" script run by `/etc/rmf` before file removal.

SD allows for as many as nine control scripts, each with a reserved name. They are commonly associated with filesets; however, control scripts may also be associated with products. They are:

FIGURE 4 swinstall Overview

checkinstall Run in a *swinstall* session during the analysis phase.

preinstall Run in a *swinstall* session immediately before loading the fileset's files.

postinstall Run in a *swinstall* session immediately after loading the fileset's files. It is also run in a configure session.

checkremove Run in a *swremove* session during the analysis phase.

unconfigure Run in a *swremove* session before removing filesets. It is also run in an unconfigure session.

preremove Run in a *swremove* session immediately before removing the fileset's files.

postremove Run in a *swremove* session immediately after removing the fileset's files.

verify Run in a *swverify* session.

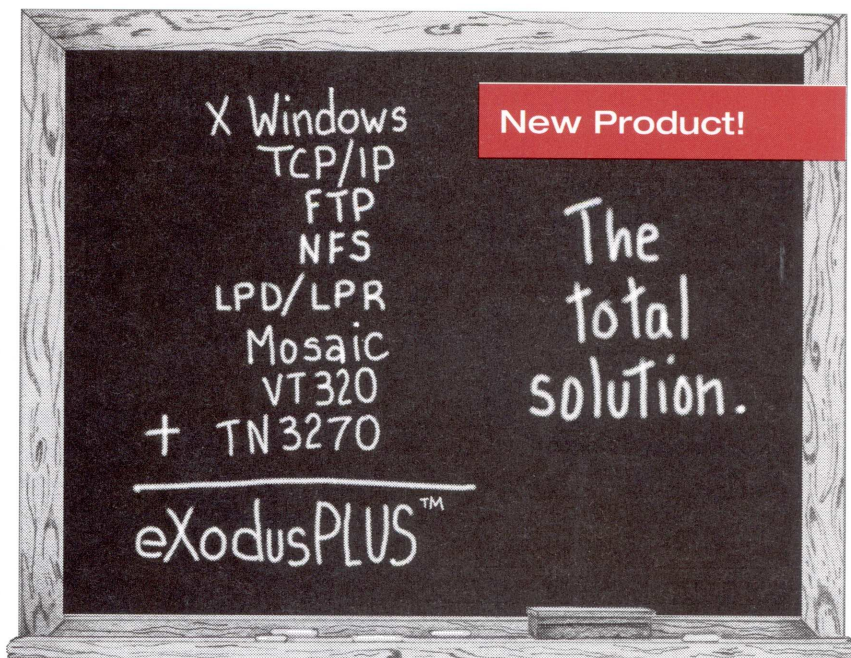
Figure 4 shows where each of the four *swinstall* control scripts is executed in the software installation process.

In addition to the above control scripts, software developers can provide auxiliary scripts. They are packaged with the software and are treated in the same manner as control scripts. They can have any name that doesn't conflict with SD's reserved names.

Each control script is optional; if one does not exist, it is treated as a script that returns "0." Developers have been advised to deliver only those scripts that are needed.

This article has presented a high-level view of features that SD provides for HP-UX system administrators. In the next issue of *hp-ux/usr*, Part 2 of "SD for HP-UX 10.0" will present some typical uses of SD commands, in the form of hypothetical scenarios an administrator might encounter. ■

Bill Mullaney (wtm@fc.hp.com) is a software development engineer for Hewlett-Packard in Fort Collins, Colorado. He has worked on SD-UX for three years, and on /etc/update and other HP-UX software management tools for several years before that.



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CIRCLE 175 ON READER SERVICE CARD

Software Review

by Greg Cagle

Ishmail

THE SUBJECT OF THIS review is ismail, an X/Motif Mail User Agent for UNIX platforms, from Hal Software System, a division of Hal Computer Systems. ismail is available for a variety of UNIX systems, including SunOS, Solaris, DEC OSF/1, IBM AIX, Hewlett-Packard HP-UX, Linux, and Novell UnixWare. The version reviewed is 1.0, running on an HP 715/80 at HP-UX 10.0 under CDE. Halsoft officially supports HP-UX 9.03, but I saw no problems with 10.0.

Features

X/Motif Interface

The GUI provided by ismail is roughly similar to other X/Motif mail clients I've used. The main window (*Figure 1*) consists of a menu bar, a sub-window that displays open folders, a row of buttons, a message summary display, and a small status window. All aspects

are customizable to some extent (see below) except the menu bar. I have customized the main window in *Figure 1* slightly, adding a few buttons. Usage of the main window is intuitive; double clicking on a folder icon switches the display to that folder, and double clicking on a message within the display brings up the message in the Reading Window (*Figure 2*).

This window consists of a menu bar, a header subwindow, the main message display, and a row of buttons. The Reading Window displays one message at a time, unless the pushpin is used. Multiple Reading Windows can be present on the display. Message composition is performed in the Composition Window (*Figure 3*). It consists of the usual menu bar, header input fields, main message input area, and a row of buttons. ismail does not support drag and drop within HP-VUE or CDE. Within the main window you can drag messages to folders or the reading window using the middle mouse button. Keyboard shortcuts for menu items are supported in the standard X/Motif fashion, defined by resources. In general, ismail is a good example of X/Motif look and feel.

Full MIME and Rich Text Capability

MIME is fully supported by ismail. An example of a MIME message with rich text is the welcome message from Hal (*Figures 4 and 5*). *Figure 4* shows ismail's rich text display capability, and *Figure 5* shows how attached image and audio files are handled. A single left button click on the icon spawns an external viewer (defined by your mailcap file) to display the image or play the audio. Clicking on the icon with the right mouse button brings up a popup menu allowing you to show, hide, save, or retrieve the item.

At-a-Glance

Ishmail 1.0

Pricing

Number of Users	Price per User
1-9	\$99
10-24	\$89
25-49	\$79
50-99	\$69
100+	\$49

For universities, subtract \$20 per user from each of these prices. Larger sites can get custom quotes.

30-day demo copies are available for FTP.

e-mail: ishmail-support@halsoft.com

Phone: (800) 762-0253 or (512) 834 9962.

Web: <http://www.halsoft.com/products/ishmail/>

Within the Composition Window, it is easy to generate rich text, and include or attach image or audio or other file types. Menu picks allow you to change selected text to bold or italic, for example, or make it bigger or smaller. Other menus allow you to attach or include text files, rich text files, GIF or JPEG images, u-law audio files, MPEG video files, binaries, PostScript files, ODA files, RFC822 files, or any random file that you can figure out a MIME type for. You also can specify "parallel containers," which allow two elements to be tied together in a parallel fashion. This allows you to specify that two elements must be displayed together. An example of this is playing an MPEG video and an accompanying audio clip simultaneously. You can also easily embed rich text in your signature file using the signature edit window if you are so inclined.

Customization

ishmail is highly customizable, with the single exception of colors. Colors must be modified with X resources; the theory is that it makes more sense to let the window manager take care of colors. Other than that, each window has an options menu, as well as various onscreen customizations. The main window allows you to modify the field width of the message display lines by dragging the small vertical lines between the fields, as well as by the preferences menu. I particularly enjoyed the small status icon in the main message window; you can tell at a glance whether a message has been read, marked for deletion, saved, or has MIME content.

Each window has a button row that can be configured to be laid out horizontally or vertically on any side of the window. The buttons themselves can be

FIGURE 1

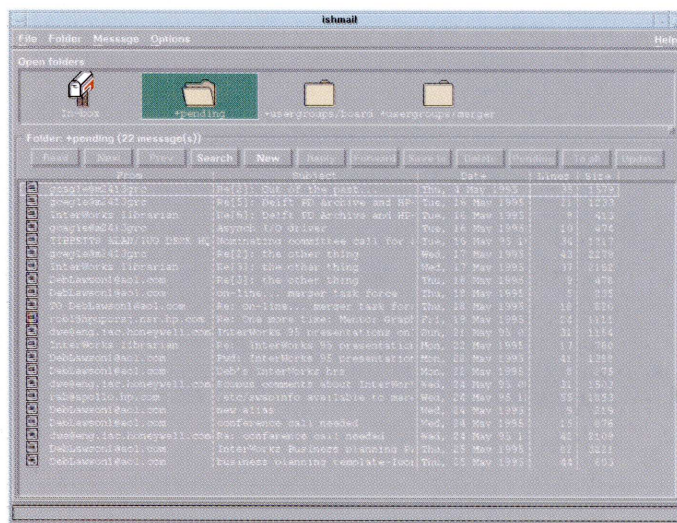


FIGURE 2

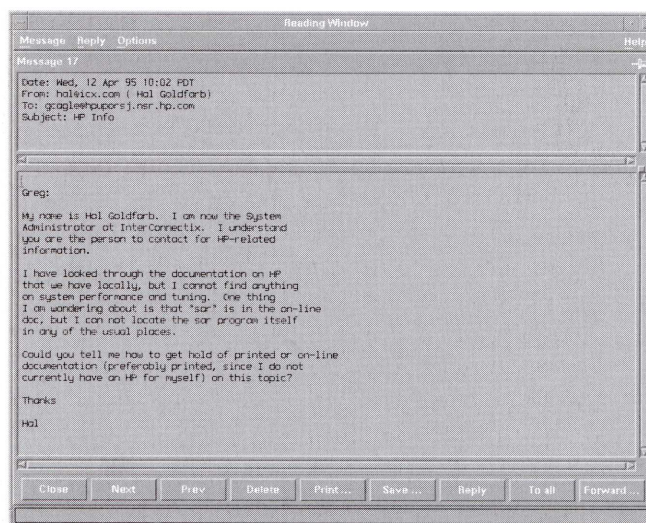
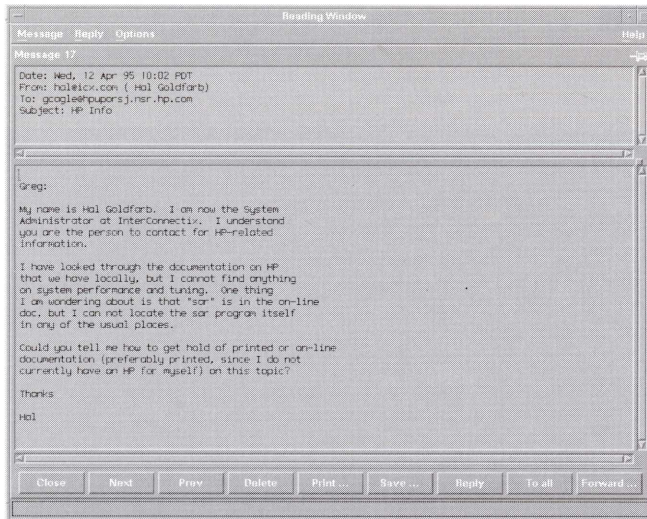


FIGURE 3



set to any action available from the menu bar of that window. There is no scripting ability, and there are no commands available other than the menu commands.

The message header customization window (Figure 6) is one of the best I've seen; it's very intuitive. You can also select fonts for the buttons, labels, text, and lists.

Further customization beyond what's available from the Preferences menu is supported using the standard X resource mechanism. You can place resources in the usual places, or in the `$HOME/.ishmailrc` file. And, you can customize the MIME handling in the `$HOME/.mailcap` file, which I'm not going to cover here.

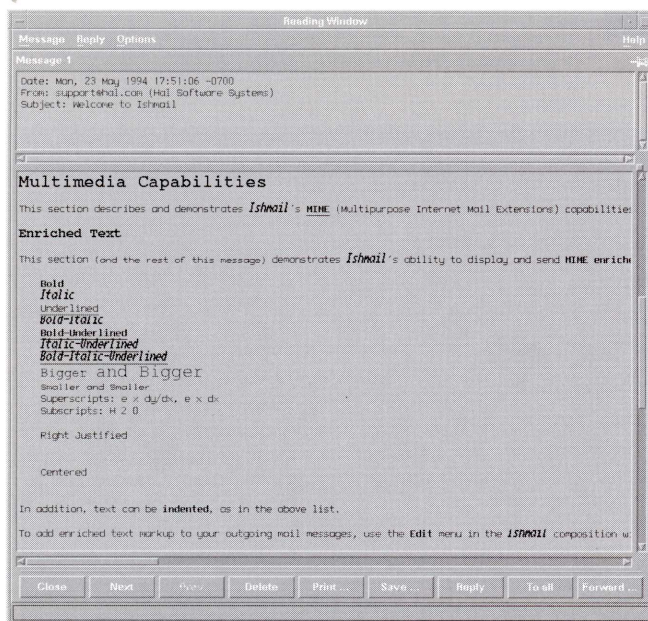
Searching and Sorting

Sorting is supported on message number, status, subject, sender, date, line count, and byte count. ismail does not supply a method for assigning message priorities. You can also combine the sort parameters. Searching is primarily pattern driven; you can either use a simple pattern or generate a complex expression using relational operators and combinations of mail message elements (Figure 7). Like Z-Mail, you can't search multiple folders, or trees of folders, which I view as a significant limitation. I often end up using *grep* to search many folders because I can't remember where I put something.

Alerts

ishmail supports the concept of alerts, which allow you, on the arrival of incoming mail, to run any UNIX command based on the result of a regular expression match of the headers. You can, as an example, play a sound when mail arrives from a particular person. And the alert icon select window allows you

FIGURE 4



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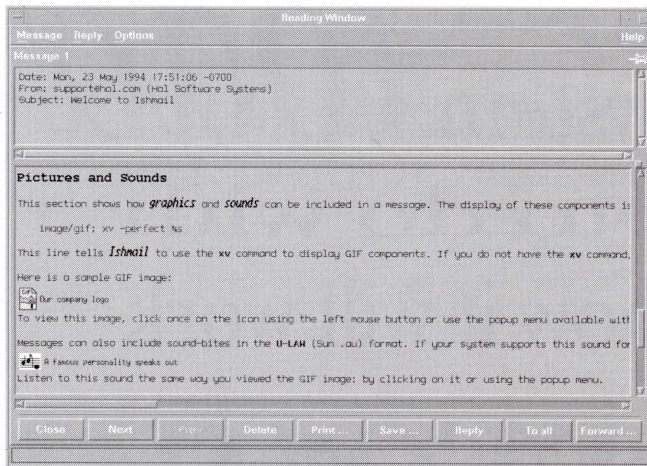
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FIGURE 5



tation. The full user's guide is available in PostScript or hypertext format from Halsoft's FTP site (listed below). Cursor-sensitive "quick help" is also available.

Licensing

Once you have purchased a license, Halsoft will provide you with a license key which you place in a file called "license" in the ismail binary directory. The license is tied to IP address and limits the number of users on the machine at that IP address. The identity of the users can be changed without requiring a new license to be generated. ismail does not support or require network licensing to my knowledge, so you can't have "floating licenses."

Installation

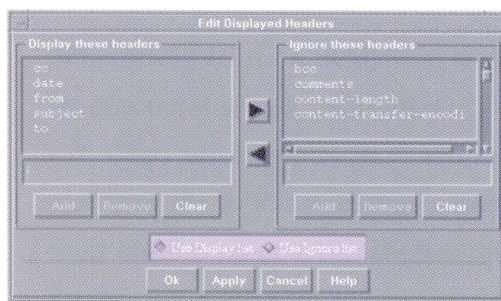
Installation was actually a pleasant surprise; ismail is available from Halsoft's FTP site in *update(1m)* format. So I was able to install it on a system running HP-UX 9.05 using the native tools, and then move the installed tree (*/usr/ishmail*) to my 10.0 system at */opt/ishmail*. Halsoft does not yet have ismail available in 10.x SD depot format. ismail is also provided in tar format if desired, with a *pkgadd* installation script that fixed permissions and places a link from */usr/bin/ishmail* to the actual location. The distribution is just over 5 MB as shipped, and occupies 5,160,960 bytes after installation, excluding the license file.

Usability

ishmail is quite easy to use for both novice and power users. Customization is also intuitive, with the exception of the colors.

Compatibility with other MUAs is excellent, with one exception. ismail understands both mh and "regular

FIGURE 6



to tie an icon display to a particular alert if you desire.

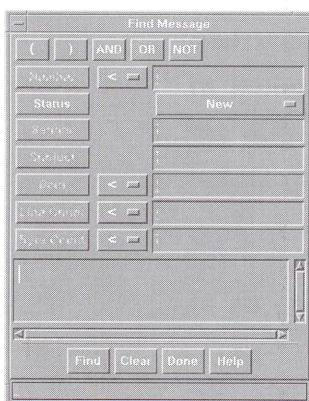
Alias and Address Management

Alias management within ismail is fairly primitive. The alias preferences window allows editing of alias maps as you might expect, but there is no address book or equivalent. The aliases are stored in *\$HOME/.mailrc*.

Online Context-Sensitive Help

ishmail supplies extensive context-sensitive online help. It does not, however, have hypertext or search capability. It does cover pretty much every topic most users would ever care about, and I see no need to refer to other documen-

FIGURE 7



UNIX" style mail folders, and is fully compatible with other MIME-compliant MUAs. I did experience a bug in that the "From" header date format generated on outgoing messages is not compatible with what elm expects, and thus elm thinks any folder with an outgoing message in it is corrupt. Other mailers such as dtmail and Z-Mail did not complain about that, however.

ishmail stores its aliases in `$HOME/.mailrc`, so they are usable from other MUAs that look there. ishmail-specific customizations are stored in `$HOME/.ishmailrc`.

Reliability

ishmail 1.0 has been reliable throughout my test period and has never crashed or corrupted a mail folder.

I did experience a problem with ishmail 1.0.5, which I loaded in the hope that the above compatibility issue would be resolved (it wasn't). 1.0.5 was unable to find my signature file when sending a message, where 1.0 was able to find it successfully.

Beta versions of ishmail that I used previously (0.6, 0.8) were quite reliable for beta software.

Performance

Performance appears to be on the same level as that of other X/Motif MUAs; I have many large folders and was never impatient while waiting for them to be accessed. For example, a large folder of mine has 681 messages and is 1.8 megabytes; ishmail opened the folder in seven seconds.

Supportability

My experience with Halsoft support has been first-rate. While using 1.0, I e-mailed Halsoft's support address

(listed below) several times, both for problems (the compatibility issue mentioned above) and questions (how to customize colors) and got quick response each time from one of the actual developers. Tom Lang from Hal even supplied a perl script to temporarily evade the compatibility problem.

ishmail is statically linked with X11R4 and Motif libraries, so shared library versioning is not an issue.

Summary

I will be reviewing Siren Mail in an upcoming issue. ishmail's main competition is Z-Mail, which I previously reviewed in this space. ishmail supplies some features that Z-Mail doesn't have, and it has a better model for dealing with MIME and rich text. It does lack some power features that Z-Mail provides. Overall, I'd say that ishmail is

very appropriate for people who don't require the power features of Z-Mail. It's now my MUA of choice. ■

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by Andrew J. Phillips

As the usage of HP-UX systems grows, more and more advantage can be taken of the unique programming environments that HP-UX provides. These environments range from the older and better documented command-line interface (or shell) to the more recent and complex CDE (Common Desktop Environment) and DCE (Distributed Computing Environment) standards.

Any HP-UX system provides a multi-user, multitasking environment that is, at its core, a general-purpose computing system. That implies a significant amount of flexibility in terms of resources and configuration. For the purpose of this article, I will assume the reader has access to a reasonably well-configured system running HP-UX 8.0 or later that is connected to a LAN, since that describes the majority of HP-UX machines.

For conciseness, I will also assume that the reader understands and is familiar with the concepts of the HP-UX operating system, the file system, permissions and security, and knows how to use the man pages. If that is not the case, I would recommend reading an introductory text such as *A UNIX Primer* by Steven Prata, or perusing some of the other references listed at the end of this article. For clarity, the reader should also have some experience using a programming language such as Pascal or C. If you have read a man page in the last month or so, you should have little difficulty understanding this article.

This article attempts to provide an overview of some of the principles and practices associated with rapid application development (RAD) using the Korn shell. First, an informal survey of some of the available tools

Illustration by Courtney Graner

Getting the Most out of HP-UX

for application development is presented. Then, some of the capabilities and access methods of HP-UX systems are examined; next, some basic shell and shell programming concepts are explored; finally a case study is presented of a real-life utility being used today. I have included several examples to enable you to understand the choices that need to be made and to help get you started with shell programming.

Survey of Some Popular Tools

Users of HP-UX workstations have a rich programming environment and many tools to choose from. Many high-level languages are available, including C, Pascal, and FORTRAN. I will refer to these as third-generation languages (3GLs). There are also many 4GLs available, such as Smalltalk, PERL, and C++. To help the novice (or experienced) programmer using the X Window System, the so-called GUI builders (for Graphical User Interface) not only help create interfaces, but also generate code for Microsoft Windows. One example of such a package is UIM/X, from Visual Edge Software, Ltd.

To help the programmer integrate these tools, various programming environments such as HP SoftBench or comprehensive libraries such as the MKS Toolkit are also available for a price. Deciding which tools to use in your environment is an important step in empowering programmers for rapid application development (RAD).

I suggest the following as an aid to choosing the best tool or tools for the job. Problem solving naturally depends on which kind of problem it is you wish to solve. If your problem can be solved by manipulating strings or ASCII files, the Korn shell itself is often a suitable choice (see case study later on).

On the other hand, if your problem involves significant number crunching or systematic calculations, one of the 3GLs mentioned earlier may be suitable. For GUI development or database access, either a 3GL or 4GL with appropriate libraries can be very cost-effective.

Network Access Methods

Since applications typically need to access other machines to retrieve data, possibly from a database, or to access other resources not available locally, network access is very important to any problem solving strategy. Application programs in general can use a wide variety of methods to access other systems. Some of the more frequently used include remote procedure call, or RPC, developed by Sun Microsystems but implemented by almost all UNIX system vendors; Berkeley sockets (really a library of system calls); and DCE, or Distributed Computing Environment, a comprehensive framework of cooperative services from the Open Software Foundation. A relatively simple method to make files on one machine available to processes on another involves utilizing the Network File System, or NFS. NFS allows one networked machine to access a directory from another networked machine, and to have it appear much like a local directory. We will see an example of how to do this in the case study.

The HP-UX Korn shell

I have chosen to use the Korn shell rather than the other available shells (C or Bourne) for several reasons. I began using UNIX under the C shell, but later experience with functions, aliasing, and editing previous commands convinced

me to change. Later, the emergence of a windowing Korn shell as part of the Common Desktop Environment (CDE) reinforced my choice of the Korn shell. Therefore, I will not mention other shells in this article, even though they are similar in many ways.

The very first interaction most people have with an HP-UX system is the infamous command line or “shell” program that provides the user interface to many UNIX systems. A typical command line prompt is ‘\$’ (or ‘#’ if you are root), akin to the typical MS-DOS command line prompt ‘C>’. The UNIX shell has been described as one of the best 4GLs ever invented, because of its combination of power and flexibility. Conceptually, the shell can be thought of as something that reads commands, and then executes them, not unlike some language interpreters. In general, most shell commands follow a quasi-standard format I will refer to as the synopsis:

```

      |----- parameters -----|
COMMAND <options>                <arguments>

```

where COMMAND is the filename of the executable. Parameters are everything except the command itself; <options> are flags that typically change the behavior of the command, and the <arguments> specify what the command should operate upon. For example, if I type `rm *` the `rm` command will be found and executed, and the shell will evaluate the ‘*’ to represent all ordinary files. So, this command will simply delete any files present in the current working directory, assuming, of course, that the user of this `rm` command has the appropriate privileges. If the ‘-i’ option is added (for example: `rm -i *`), the behavior of the command is modified so that it prompts the user for confirmation before removing each file.

So, the simplest problem solving approaches in HP-UX can first start with single shell commands. Since most problems are more complex than what can be accomplished with a single built-in command, the next step will be to blend several commands together in order to achieve the desired result. For example, if I wanted to collect all the addresses from my phone book that were located in say, California, sort them, and mail them to my manager, I could type:

```
grep ' CA ' phone book | sort | mailx jlv
```

To explain this step by step, the `grep` command selects all the records from the file named *phonebook* that contain the abbreviation for California (with blanks before and after). This is done so that any records containing the string ‘CA’ as part of a name, street name, or company will not be selected. These records are then redirected, or ‘piped,’ as input to the `sort` command, which in turn ‘pipes’ the sorted records to the mail program, which then mails them to user `jlv`, who happens to be my manager. In the terminology of HP-UX, the `grep` command is a FILTER, because it filters out some of the input, and the ‘|’ (pipe) symbol implies redirection, because it redirects the standard output from the controlling terminal to somewhere else, in this case, an executable command, where it is processed as if it were read from the standard input. Another way of specifying redirection is to use the ‘>’ symbol, which can be used to place output into a file; the ‘>>’ symbol can be used to append output to a file. We will see more examples of redirection later on.

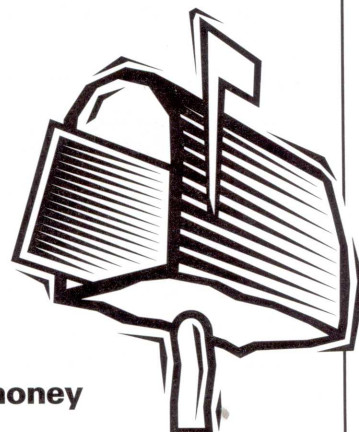
In this way, we can see that by combining several commands, we are able to accomplish some relatively complex tasks with a minimum of effort. To help make this environment even more powerful, the shell also evaluates the entire command line for you, so that file names can be selected more easily using a regular expression (something the shell knows how to evaluate—see the man page for *regex*). We saw this before with the `rm *` example. A regular expression can be as simple as `*.c` (which even MS-DOS can handle, sort of). This `*.c` would be expanded to read all files with names ending with a period followed by a lower-case ‘c’. A slightly more complex regular expression is `[Mm]*[Mm]`. This would be expanded to include all files with names beginning with an ‘m’ (either upper or lower case) followed by any number of characters, and ending with an ‘m’ (also either upper or lower case). These regular expressions allow the user to specify file names (and some other things as well) using a flexible and powerful syntax.

The next shell facility I will discuss allows us to interact passively with system settings by reading and writing shell variables. Shell variables are much akin to global variables in other languages, except that they do not have to be declared or initialized before use.

For instance, the shell variable named `PATH` is used every time a command is typed, since the shell will search the directories represented by the `PATH` variable for a matching executable file name. So, when you type `ls`, the system actually knows to execute `/bin/ls` (providing, of course, that `/bin` is part

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of your PATH). The actual value of the PATH variable can be determined by just echoing its value to stdout (using the shell echo command). When assigning a value to a shell variable, one need use only the variable's name, as in `PATH=/bin`. To read the current value of a shell variable, one typically places a `$` before the variable name, as in :

```
echo $PATH
```

On my system, this results in:

```
/usr/vue/bin:/usr/bin/X11:/bin:/usr/bin:/usr/local/bin
```

which is a small, but useful path. Other 'standard' shell variables include :

```
USER=ajp
SHELL=/bin/ksh
HOME=/users/ajp
TERM=hpterm
LINES=24
COLUMNS=80
DISPLAY=r3125xxx:0.0
```

The `set` command, with no parameters, will provide a more comprehensive list of the variables and their values present in your environment. The ones shown above indicate that I log into the system as 'ajp' and I use the Korn shell. My login directory is named `ajp` under `/users`; I am using the `hpterm` terminal emulator with a window width of 80 characters, and the name of the display I am using is `r3125xxx`.

If some of this is beginning to sound like Greek to you, I suggest you try the `keysh` shell that is provided with HP-UX systems. This shell is helpful for people who are just learning because it uses the old familiar softkeys to help the user issue commands even if he or she isn't familiar with their arguments. The `keysh` provides a status line with indicators for mail, the current directory, and other useful information. Also, one can see the resulting command generated by the `keysh`. This can be a great help in learning the standard parameters for individual shell commands.

Korn shell scripts

The next step in our list of problem-solving approaches for HP-UX is to combine a series of individual commands into what is known as a script. On the simplest level, a shell script can be just a few standard commands lumped together in a file so that one need type only the filename instead of each command in turn. In fact, example script #1 is just that. Note that the file containing the shell script should be executable, and a '#' sign indicates a comment. So, referring to *Example 1*, when I type `showme` (to run the script), the three commands in file `showme` are executed (just as if I had typed them in myself), and the result is


```
Sat Jul  2 12:44:40 EDT 1995
ajp      tty2      Jun 30 14:53
/users/ajp
```

I could have achieved this same result by simply entering

```
date; who am i; pwd
```

on a single command line. While this example only illustrates a rather trivial use of shell scripting, shell scripts in general are far more than just a way to save some typing. In fact, I hope to show that shell scripts can provide many of the features of high-level programming languages, while being easier to use.

Well, what features of high-level languages does the Korn shell support, you may ask. For starters, the Korn shell provides the normal *if* statements and *case* constructs. Loop control can be accomplished using *for*, *while*, and *until* (a *while* loop that tests at the end). Shell variables can be used much like variables in other languages, except that the Korn shell supports fewer data types.

Parameter substitution is another powerful feature of HP-UX, both when writing shell scripts and when using the shell interactively. In simple terms, one can refer to the parameters to one's shell script as *\$1*, *\$2*, *\$3*, etc. (corresponding to the first, second and third parameters) or as *\$**, which refers to all the given parameters at once.

To help illustrate the use of control structures, parameters, and looping, the *Example 2* script upshifts lines (read from *stdin*) containing the string represented by the first parameter to the script (line numbers have been included only to aid in the discussion). A step-by-step discussion of this example follows.

EXAMPLE 1 *showme, a Trivial Script*

```
#
# This is a trivial script
#
date      # display the current date & time
who am i  # show user name, login terminal and time
pwd       # show current directory
```

EXAMPLE 2 *Simple Loop*

```
#
# This script upshifts an entire line when the first
# parameter occurs within that line.
#
1 while read line
2   do
3     CHECK= `echo $line | grep $1 `
4     if [ "$CHECK" != "" ]
5       then
6         line=`echo $line | tr "[:lower:]" "[:upper:]" `
7       fi
8     echo $line
9   done
```

Line 1: the *while* here reads from *stdin* into the variable *line* until end-of-file (or a line containing only a <RETURN> is entered). Lines 2 and 9 define the statements to be performed inside the *while* loop.

Line 3: this line sets the value of the shell variable *CHECK* to the value of the first parameter (if that string is present in the shell variable *line*) or to the empty string (if the first parameter's value is not present within the value of *line*). This is done in order to determine if the line should be upshifted or not.

Line 4: this *if* statement translates the entire string from lowercase to uppercase if the shell variable *CHECK* is not empty.

Line 6: this statement pipes the current string (in the variable *\$line*) through the *tr* command, which (using the given parameters) will perform the upshifting and then re-assign this new value to the shell variable *line*.

Line 8: this line simply writes each input line (whether or not it has been upshifted) to *stdout*.

This script can then be used to capitalize only certain lines within a file, based upon their content. To make this script read from the file */tmp/article_data*, upshift any lines containing "HP-UX," and place the output into the file called *hp-ux_data* in my login directory, I would invoke it as follows:

EXAMPLE 3 *Function Keys*

```
# This function can set USER definable softkeys for HP terminals
# The parameters passed are:   <key number> <label> <string>
# where key number = the softkey to set
#       label       = the softkey label
#       string      = the string that gets sent when key pressed

set_fkey ()
{
  llen=${#2}
  slen=${#3}
  echo "\033&jB"
  echo "\033&f2a${1}k${llen}d${slen}L${2}${3}"
}

set_fkey "1" "  f1      F1      " "I hit th F1 Key !"
set_fkey "2" "  QUIT    " "quit"
set_fkey "3" "  DIR      " "ls -l"
```

example2 HP-UX < /tmp/article_data > \$HOME/hp-ux_data

In this way, I can use parameters and redirection to control how the script will behave (which lines it will capitalize), where the input comes from, and where the output is sent. I believe these concepts are fundamental to harnessing the power of the shell.

Now that we understand the basics, but before we go on to the case study, I'll cover one more programming concept that will allow us to modularize our shell programs so they are much more powerful and also easier to read and understand. This is the concept of functions (or procedures), a common one in many languages. The Korn shell allows us to define functions using the following syntax:

```
my_function_name()
{
  # This would be the body of the function
  # Each function can access any shell variables
  # within its scope, as well as any parameters
  # provided when it is invoked.
  echo " This is my_function_name "
}
```

Korn shell scripts are simply ASCII files that contain comments, indicated by a pound sign '#', and shell commands, which are just about anything else. The different styles of braces in this example function are both significant and required. To call a function that has been defined within a shell script, one need only type its name (just like any other command), and in fact, the function *is* a (user-defined) command in the shell. To pass parameters to a Korn shell function, we just place them after the name of the function and refer to them inside the function as \$1, \$2, and so on. If we want our function to pass data back, however, we must use shell variables

rather than parameters.

The script shown in *Example 3* provides a reasonably good (and useful) example of how to define and use a Korn shell function. First, we have the definition for a function named *set_fkey*. This function can be used to define the user softkeys for HP terminals (or terminal emulators). It expects to have three parameters passed to it (these are mentioned in the comments at the beginning of the script). The first two lines of the function definition use a special shell syntax for determining the LENGTH of these parameters, and assign these values to *llen* and *slen*, respectively. The next statement, an *echo*, just turns on the user softkeys. The final statement, another *echo*, simply sends an escape sequence that initializes the given function key.

So, to summarize, we now have a programming environment that has flexible I/O facilities (pipes and redirection), some of the normal control constructs (like *if*, *case*, *for*, *while*), and subroutine calls in the form of functions. An incredible array of string and file processing routines is available with HP-UX, and we will look briefly at some

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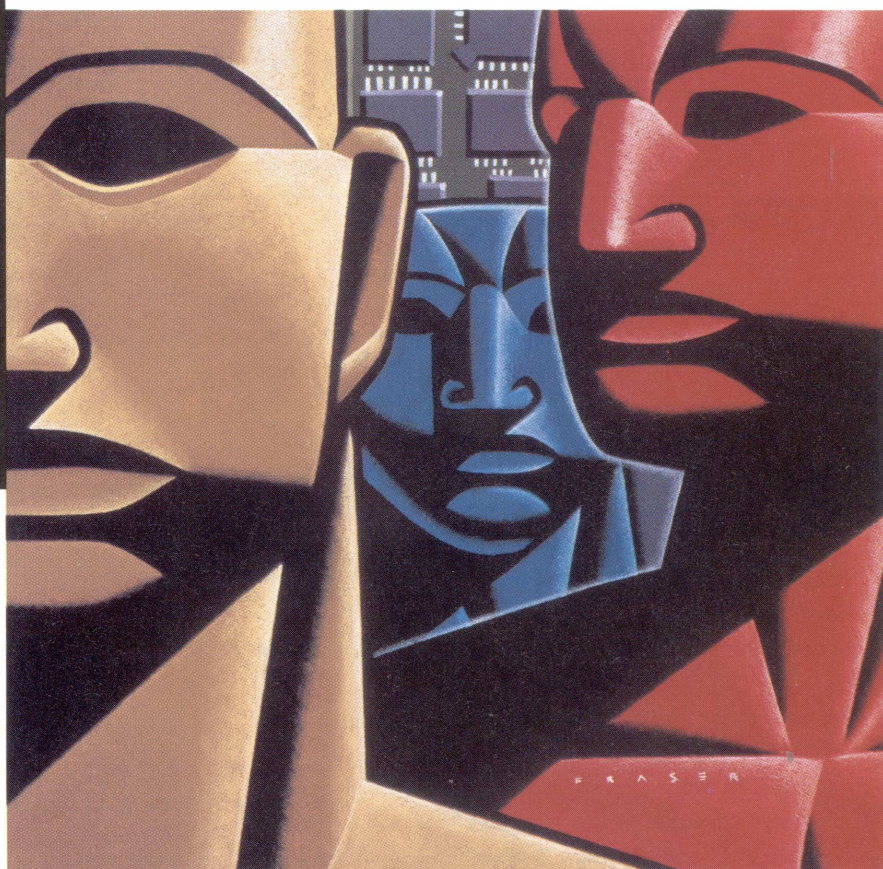
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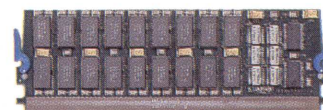
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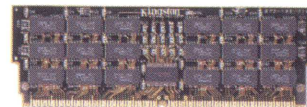
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EXAMPLE 4 *First Lookup function*

```
#
# lookup function - checks for both JOB and MACHINE, and
#                  displays all 3 phone numbers
#
1 lookup()
2 {
3   echo " Enter the job that aborted : \c"
4   read JOB
5   echo " Enter the machine name : \c"
6   read MACHINE
7   grep $JOB $ABORTBOOK | grep $MACHINE > /tmp/recs$$
8
9   while read line
10  do
11    echo $line
12    NAME1=`echo $line | cut -f 4 `
13    NAME2=`echo $line | cut -f 6 `
14    NAME3=`echo $line | cut -f 7 `
15    display_phones $NAME1 $NAME2 $NAME3
16  done < /tmp/recs$$
17  rm /tmp/recs$$
18 }
```

of these facilities. For an in-depth treatment of these facilities, see references [3] and [4].

Case Study-CDB

This case deals with one of the results of a company-wide consolidation. After 18 data centers were "moved" into a single facility, the computer operations group found that their job abort process was not adequate when literally thousands of jobs were involved. They simply could not keep track of the shifting support assignments and the myriad notification requests. So, a project was begun to put all the batch jobs, machine names (over 100), support people, and their phone numbers into a database that operations could use when jobs aborted. While that was under way, a quick and dirty interim solution was also begun. This article is the result of the interim solution, which has helped HP 3000 computer operators in Atlanta for over two years now.

It turned out that what the operators really wanted was a quick way to find the right phone number to call, given a particular job. They had the names of the jobs that aborted from an abort printer, and they were responsible for notifying the proper support person. All the operators would need simultaneous access, and there would have to be a way to make the inevitable moves, adds, and other changes when the need arose.

I was new in my job and had been experimenting with shell scripts. I had recently implemented (yes, just for grins) a phone book utility that had been given as an example in a textbook, and it seemed to provide for the basic elements (data file, lookup, and modify mechanisms) required for a solution to the job-abort problem. I had recently

EXAMPLE 4A *A Better Lookup function*

```
# This function checks the jobname & system fields to match a query
#
query_for_job ()
{
  SRCH=${1}
  SRCH2=${2}
  if [ "$SRCH2" != "" ]
  then
    awk ' ( $1 ~ /'"$SRCH"'/ && $2 ~ /'"$SRCH2"'/ ) { PRINT $0 } \
          ( $1 !~ /'"$SRCH"'/ || $2 !~ /'"$SRCH2"'/ ) { ;; } ' $DBFILE > $DBRECS
  else
    awk ' ( $1 ~ /'"$SRCH"'/ ) { print $0 } \
          ( $1 !~ /'"$SRCH"'/ ) { ;; } ' $DBFILE > $DBRECS
  fi
}
```

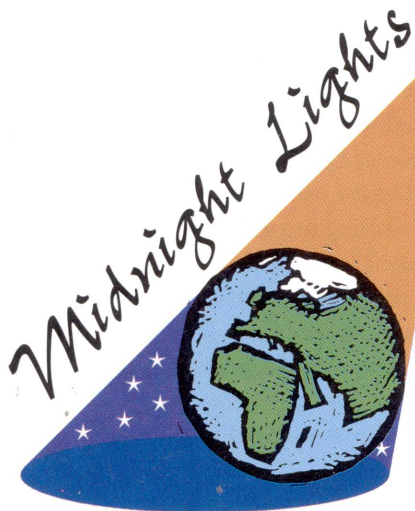

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EXAMPLE 5 Simple ADD Function

```
# This function performs ADDs - real simple right now
# just pass the filename to be modified as parameter one.
#
1 add()
2 {
3     echo " Enter the record here : "
4     read LINE
5     echo $LINE >> $1
6     sort -o $1 $1
7     echo "$LINE \n has been added to the database "
8 }
```

modified this example to make use of functions. It seemed to me that a shell script could provide a serviceable solution to this type of problem. There was also the significant advantage of having a working prototype in the form of the example I had already tested.

And so began the project known as *cdb* (for Contacts Data Base) in June of 1992; which, by its unfortunate moniker, precluded the easy use of one of the HP-UX C language debuggers.

The requirements actually called for two databases, one for names and phone numbers (like the one I already had), and another one for holding job names, machine names, peoples' names, and other things, such as whether or not a person preferred to be called in the middle of the night if the job aborted.

What I wanted to be able to do was search an ASCII file for one or two strings (job and system), and then match phone numbers with all the names associated with any qualifying records. That is, once I had the people responsible for the aborted jobs, find and display their phone numbers.

So, I began with a script that displayed a menu asking whether the user would like to look up someone in the database, add or change something, or exit. It also had defined functions for lookup, add, remove, change, display,

and listall. Let's start with a very simple lookup() function. This is shown in *Example 4*.

This lookup function first prompts the user for the job and machine combination to find. These values are read into the shell variables *JOB* and *MACHINE*, respectively. Line 7 filters the qualifying records from the database and places them in a file called */tmp/recs\$\$*. The UNIX *grep* command is used to accomplish this. This blend of two *grep* commands is, for now, our search mechanism for finding records that contain both the proper job and machine name.

The \$\$ metacharacters used as part of the temporary file name are replaced with the process id number of the current process. This allows more than one lookup to proceed simultaneously without interference. The while loop on line 9 reads through the qualifying records (specified on line 16 as redirected input to the loop), echoes them out, and calls *display_phones* (another function) once per record to show the phone numbers for the three contacts. The statements on lines 12 through 14 extract fields four, six, and seven from the record in *\$line* and use these as contact name parameters to the function *display_phones*. The *rm* command on line 17 cleans up the temporary file after processing is complete.

This provides essentially what the operators needed: it lists phone numbers when given a job and machine name. Now that we have lookups working, we must also provide for adding, modifying, and deleting records from either the *phonebook* or *abortbook* files. Toward that end, let's look at a minimal *add()* function that will work for both files. This can be seen in *Example 5*.

Here, line 1 begins the syntax for defining the *ksh* function *add*. Everything within the curly braces is the function definition. Lines 3 and 4 prompt the user for input and place that input into a shell variable called *LINE*. Line 5 appends the new data to the database (whose name was passed in *\$1*), and line 6 ensures that everything is in the proper sorted order. Confirmation is returned by line 7.

At this point, we have the skeleton of an application that fits the needs of the operators, can be used from almost any HP-UX platform, and only took about a week to write, test, load with data, and debug. That sounds like rapid application development to me.

To illustrate how the software life cycle affected the lookup algorithm, I have also included *Example 4A*. This Korn shell function is the result of several iterations of discussions with both the Operations and Support communities. This search algorithm was manifested as an *if* statement that calls one of two *awk* programs. It was designed to find *all* the records in the database corresponding to a given job and machine name. The operator could then peruse the records to determine which person should be contacted (and how). Later, with the automation of more of the process, the *awk* program grew larger and was redesigned to find the single

record that was the "best fit."

This script performs one of two searches based upon whether a machine was specified or not. The jobname is assumed to be in the shell variable *SRCH*, and the machine name in *SRCH2*. In the first case, where a machine was specified, the *awk* program firsts tests for the occurrence of the given jobname in the first field. Then, the second field is tested for the occurrence of the machine name. If BOTH of these are true (it is an AND conjunction) then the entire record is printed. Since the default behavior for *awk* is to print a record, a second statement is required that essentially says, if there is NOT a match, don't do anything. This is the `{ ;; }` statement. The second part of the *if* statement handles the case where a machine was NOT specified, and therefore only has to do half of the work (check for jobname in the first field only).

Any matching records will be found later on in the file referenced by the variable *DBRECS*.

Access Methods for CDB

Now that all the operators can get phone numbers immediately after a job abort, the next task is to ensure that the proper people can keep this database accurate. To do this means that we must provide all the application support people easy access to our *abortbook* database. This was accomplished using NFS to mount the *cdb* directory onto all the servers used by the application support groups.

To make this work, not only did we have to allow all these people write access to the database, but some method of concurrency control was required. This results from the fact that when two different people want to make changes to the same file, something must be done to keep the second person's changes from overwriting the changes made by the first. To do this, a locking mechanism was introduced that followed this simple algorithm:

```
1  if [ -r $lockfile ]
2  then
3    cat $lockfile # the file contains info about who and when
4    exit
5  else
6    date; who am i > $lockfile
7    < OK to MAKE CHANGES to DATABASE HERE >
8    rm $lockfile
9  fi
```

Here, line 1 checks to see if someone has already locked the database. If so, we print the contents of the lockfile (to show who has it locked) and then exit. Otherwise, we create a new lockfile (that shows who we are and when we locked it), and proceed to make our changes. When we are finished, we must remove the lockfile to allow the next person to make updates. While this scheme is simple at best, it does prevent changes getting lost (as long as all edits are done using this script). This algorithm does *not* provide for concurrent write access, but

we were able to live with that since, on average, there was only a single change made per day.

Other Business Controls and Life Cycle

Ultimately, we wound up with two scripts for the abort process: one used by operations to perform lookups, print the entire database, and change phone numbers when needed, and one used by the application support groups to make moves, adds, and changes to the abortbook file. The first script has now grown to about seven pages, and the second (requiring more complexity) is almost thirteen pages long. Most of this growth was due to the addition of business controls during the extended life cycle of this temporary solution.

Those business controls included implementing a log file so that changes could be tracked, adding passwords to functions such as changing the phonebook file, and making the update script much easier to use. Code for generating a logfile was done rather simply in two parts. First, during program initialization, the hostname, user name, date, time, and so on were written out, indicating the start of a transaction. Then, any time a fatal error or any reason for program termination occurred, the function shown in *Example 6* was called instead of *exit*. This function accepts an optional parameter that can be used to indicate the reason for any abnormal termination. It first prints an error message to the terminal, and then sets up the appropriate logfile message. It then writes a record to the logfile (the `>>` indicates append mode file access) and removes any temporary files that

EXAMPLE 5A *ADD Function with X Client*

```

4) echo " ADD/MODIFYING ENTRY  \n"
echo " Enter the JOB or APPLICATION NAME : \c" ; read SRCH
echo " Enter a SYSTEM name [ or <RETURN> for ALL ] : \c"
read SRCH2
query_for_job "$SRCH" "$SRCH2"
if [ ! -s $DBRECS ]
then
touch $DBRECS
fi
./xcdb.${NUM}00${REV}0 $DBRECS
status=$?
if [ "$status" != "0" ]
then
echo " SORRY, but you cannot run the NEW I/F for some reason ... "
proper_ending "ERROR XCDB : status = $status : ./xcdb.${NUM}.${REV} "
fi
remove_group
sort -o $DBFILE -rd -k 1,2 HOLD $DBRECS
rm -f HOLD $DBRECS
;;

```

EXAMPLE 6 *Termination Function*

```

#
# This is an exit function, it accepts an optional string parameter
# and uses this (or a default) as an end of transaction record by
# writing to a logfile. It then "cleans up" and terminates the program.
#
proper_ending()
{
echo " Exiting Now . . . bye " > /dev/tty
if [ "$1" = "" ]
then
ENDMSG=" DONE ON "
else
ENDMSG=$1
fi
echo "SENDMSG: `date` BY : `whoami` on `hostname` \n" >> ".$DBFILE".log
rm -f ".$DBFILE" $DBRECS $PRECS $HOLD
xmit_stats
echo "\033&j@"
exit
}

```

may have existed when the function was called. After that, the *xmit_stats* function is called, which sends a message about the program to a remote server. Look for a future issue of this magazine for an article about sockets programming and the *xmit_stats* function. Finally, memory lock is disabled with an escape sequence, and the program terminates. These additions to the original program illustrate how the modularity provided by function calls can greatly simplify making modifications to your scripts.

Continuing on the subject of modifications, the users also wanted the search mechanism to be more selective (it is now a 23-line *awk* program, instead of the original two *grep* statements) and the modify and add functions also underwent significant enhancements. To date, we have added the use of softkeys instead of the original menu, and a GUI-based update module for formatting the data from moves, adds, and changes. We also provided for the use of 'wild cards' both in the abortbook records and when searching for a jobname. Now the operators no longer have to type in a jobname and machine name; we have automated the process so that the names, phone numbers, and any job abort instructions print out as part of the job abort sheet.

Example 5A shows a fragment of a case statement that deals with adding new records. Here, several functions are called to generate a file containing pertinent records. Once that has been accomplished, an executable program is called that provides an X-client for data entry and modification. Calling this executable requires two shell variables because, unlike shell scripts, the

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executable has different versions for different hardware platforms (300/400 and 700/800) and different revisions of the operating system. A variable named *status* is used after the executable is run to determine if there was any problem. If the *status* variable is anything other than zero, this indicates an error, and the appropriate action is taken (the script exits with an error message). Otherwise, the file containing the modified records is merged back into the database file, and the script continues.

Overall, implementing and maintaining this application has been relatively simple, since the code-test-debug cycle has been shortened significantly by using Korn shell scripts. In general, I was able to implement most of the requested changes by the next day! This has resulted not only in greatly streamlining the job abort process for the operations and application

support groups, but also in an up-to-date phone listing that can be shared easily by others. □

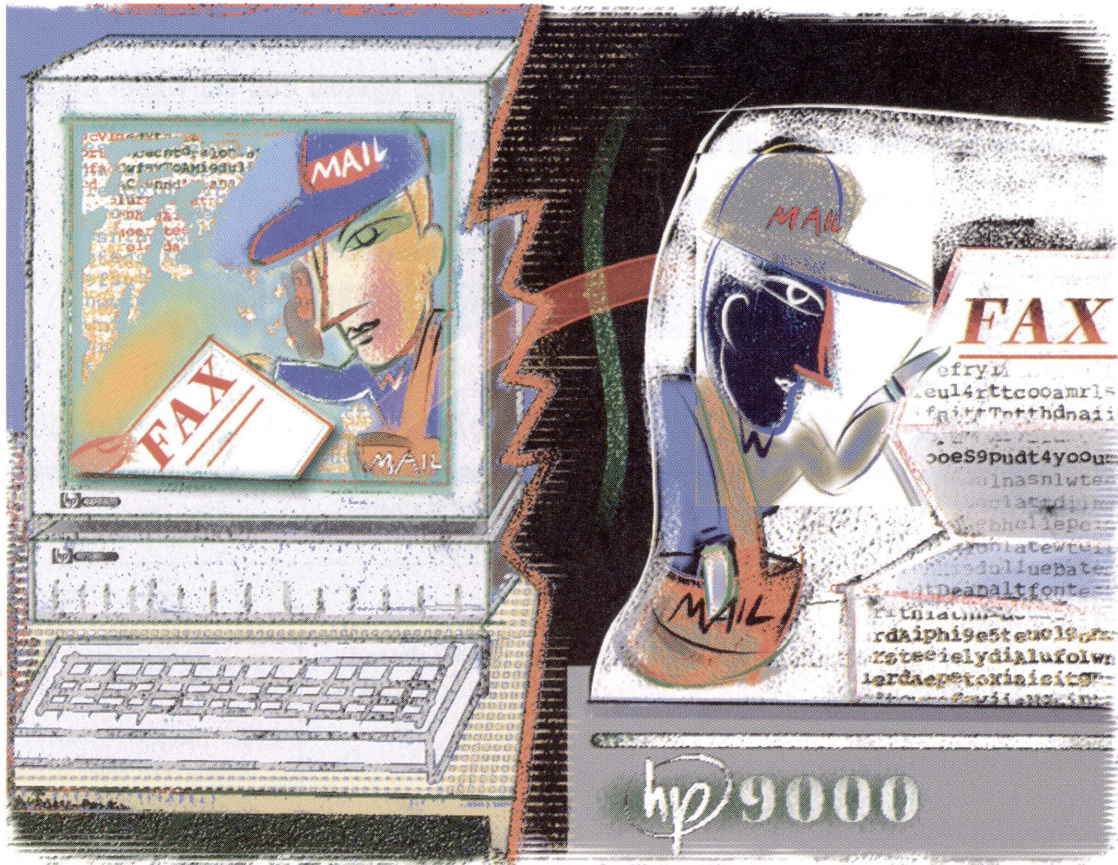
Andy Phillips is currently an Information Technology Engineer within the AFO Technology Solutions Lab in Atlanta. In the 10 years that he has worked for HP, he has been a Telecommunications Engineer, a System Manager, and Program Analyst.

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by Tony Jones

Integrating HP OpenMail and HP 9000 Fax



HP OpenMail provides enterprise-wide, client-server-based electronic messaging. HP 9000 Fax provides a client-server-based outbound and inbound fax solution. This article describes how to integrate the two products to provide a more effective solution than what is currently available. The features of this solution include:

- Fax modems directly attached to HP 9000 RS/232 ports instead of an external fax server. This can lead to a lower cost solution.
- Fax capability available for any program that can send its output to HP 9000-based printers.

Introduction to HP OpenMail Architecture

OpenMail is a software application that provides electronic mail and other messaging services. It is compliant with the X.400 Recommendations and provides facilities based on international standards to exchange and manage information.

OpenMail consists of a user agent Application Programming Interface (API) for communication with client applications, a message store that holds messages, messaging-optimized Directories and connection to X.500 Directory systems, interfaces that connect to transport systems, and gateways that link to other systems.

OpenMail uses a client-server architecture to provide

electronic mail facilities. The OpenMail architecture consists of three main parts:

1. Interfaces to the clients, the X.400 Message Transfer agent, and to Sendmail
2. Gateways to other messaging systems
3. Remaining services, such as local delivery and message routing

Every user in OpenMail is addressed in the following manner:

GivenName SurName/OrgUnit1,OrgUnit2,OrgUnit3,OrgUnit4

The four organizational units make up the *mailnode*. A user can have from one to four organizational units.

Example:

Tony Jones/hp,piscataway

Users who are on external mail systems such as the Internet can be reached via the UNIX gateway. To address users on external systems, use the Foreign Address field area, which consists of the *name@domain.organization* convention surrounded by parentheses after the mailnode.

Example:

Jim Smith/hp,UNIX(jsmith@compusa.com)

OpenMail supports a command line interface to access various functions including:

<u>Command</u>	<u>Description</u>
<i>omsend</i>	Send an electronic message
<i>omread</i>	Read an electronic message
<i>omnew</i>	List new messages
<i>omdelete</i>	Delete a message
<i>omsearch</i>	Search a directory for user(s)

Programs can use the command line interface to send program output electronically. For example, to send a report file "report.out" to a user called Tony Jones:

```
omsend -t "Tony Jones" -s "FY'94 report" -a "report.out"
-u $USER -p $PASS -q
```

The *-s* option is the subject, and the *-u* and *-p* options are for

the OpenMail user and password.

Request Server

The OpenMail Request server enables a user to mail a request to execute a script and get the results in an electronic mail message. These scripts can provide functions such as returning the amount of free disk space on the OpenMail server. Access control lists are also available to control who can access the scripts. To access the request server, replace the *GivenName* with the request (name of the script), and use "+req" as the *SurName*:

Request +req/ou1, ou2,ou3,ou4(Foreign Address Field)

Introduction to HP 9000 Fax

The HP 9000 Fax product is a client-server-based solution that allows users to send and receive faxes. In addition, inbound fax routing is available through the use of a barcode pattern located on the fax cover sheet. The fax server resides on one server and is available to multiple HP 9000 clients over the network. It is also incorporated into the HP MPower product. Fax modems are directly attached to the HP 9000 instead of using a PC-based fax gateway. This technique requires less equipment and also allows the modem to be used occasionally for inbound or outbound connections when fax functionality is not required. Incoming faxes can also be sent to a printer or a fax machine.

There are three system processes associated with HP 9000 Fax:

<u>Process</u>	<u>Description</u>
<i>faxemd</i>	Electronic mail process used to send faxes
<i>faxsched</i>	Schedules outbound faxes and returns status
<i>faxlisten</i>	Listens to the modem port waiting for incoming faxes

The client interfaces include:

- Motif-based application
- Electronic mail interface
- *lp* printer interface

Note: the mail and *lp* interface currently support only text messages.

To send a fax via the electronic mail interface:

1. Mail message to *faxemd@hostname*
2. Read in cover sheet and fill in fields

3. Add message text
4. Exit editor with save option
5. Send the message

The *faxemd* process will send a mail message reply containing the results of the fax request.

To send a fax using electronic mail, route the mail containing your fax through a system that is running the HP 9000 Fax server. Include the sender and recipient information and the message all together in the mail text.

Example: Send an electronic fax using the *elm* mailer. The host with the fax server is called *faxsys*.

1. Start the mailer

```
elm faxemd@faxsys
```

2. When prompted for a subject, press [RETURN]. You can choose to use the "subject:" keyword in the cover sheet section to describe the subject of the fax. Press "y" when prompted to continue with message.
3. When prompted for "Copies to:", press [RETURN].
4. Elm starts an editor (default is *vi*) session to allow you to enter text. Enter the following fields with the associated information.

```
from:
style:
class:
account:
subject:
to:
fax#:
message: First line of text
        Second line of text
```

5. Exit from the editor using a command that saves the file (:wq!).
6. When prompted for what to do with the file, type "s" to send the file.

To speed up typing the cover sheet, save the cover sheet portion in a file and read it into the message, then replace the information in the *to:*, *fax:*, and *message:* fields.

The *faxemd* process will pick up the fax message and fax the contents.

Printer Interface

To use the *lp* printer interface, you need to specify the fields as options to the command.

The fields required to send a fax are:

```
from:
style:
class:
account:
to:
fax#:
```

Example: To fax a message contained in */tmp/message* to Dee Wallace at (555) 562-6246, use the following command:

```
lp -dfax01      -o'from: Tony Jones'\
               -o'style: Basic (High Res)'\
               -o'class: Standard'\
               -o'account: Sample'\
               -o'to: Dee Wallace'\
               -o'fax#: 9,15555626246' /tmp/message
```

Most of the cover sheet information can be stored in a defaults file to reduce typing. The "return_envelope" keyword can be used to facilitate incoming fax routing back to the original sender. This option tells the fax server to include the sender information and a barcode return address with the outgoing fax. The recipient can use the return envelope to reply to the sender. When the return address is detected by the fax server, the incoming fax will be routed to the original sender's mailbox. The fax can then be viewed (by the Motif client) or printed.

Note: You will notice that the *lp* model script for the fax invokes the *faxemd* process. This shows how a process normally associated with mail can be used for printer interface functions.

Techniques Used to Integrate the Two Products

Use the OpenMail request server to communicate with the HP 9000 Fax server, *faxemd*. Read the OpenMail message, reformat the environment variables, place the last body part of the message in a file, then call the *faxemd* process.

The Request server provides five items to a script:

- Four environment variables:

<u>Variable</u>	<u>Description</u>
LANG	Language used by the sender (English, etc.)
OMSUBJECT	Subject field of the message

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LISTING 1 Fax Request Server Script

```

#!/bin/sh #####
#
#
# OpenMail to Fax/9000 using the request server
#
# Original Script by Stefan Buerger, PS0 - HP Germany
# Modified by Kumar Rangan, PS0 - HP New Zealand
#
# If this script is called /usr/openmail/req/fax
# Address a message to fax +req/ou1,ou2,ou3,ou4 (foreign address)
# we expect the contents of the foreign address
# to be in the format receiver@faxnumber where
#   receiver is in the format firstname lastname
#   example : Kumar Rangan@3843380
#   No spaces in the fax number, please ....
#
# variables available from OpenMail : OMSENDER, OMRECIPFA, OMSUBJECT
#
# LIMITATIONS :
#   - No spaces in the fax # part of the foreign address
#   - Conversion of the fax message to PCL format (from PC
#     based packages) is to be done *before* submitting the message
#     to OpenMail. No worries if it is only text ...
#
#   - Only 1 body part can be sent as the fax message. The
#     request server will accept only the *last* body part in
#     the message, the other parts are discarded by the request server.
#
#   - To make life easier for you, use only Fax/9000 supported
#     modems. I used the Multitech MT1432 modem successfully.
#
#####

PATH="/bin:/usr/bin:/usr/lib:/usr/fax/lib"
export PATH
TZ=NZST-12NZDT
export TZ

FAX_SENDEr='echo $OMSENDER | awk '{print $1, $2}''

FAX_SUBJECT=$OMSUBJECT

# extract the receiver's name from the foreign address
FAX_RECV='echo $OMRECIPFA | tr "@" " "|awk '{print $1,$2}''

# extract the receiver's fax number from the foreign address
FAX_NUMBER='echo $OMRECIPFA |tr "@" " "|awk '{print $3}''

# If you manage to find a generic PCL converter, use it here.
# Currently we assume that the document will be in text format
# or PCL conversion is done before the document is passed on
# to the OpenMail Client
PCL_CONV="/bin/cat -"

WORKDIR=/tmp                # faxemd works only with /tmp
FAX_PROG=/usr/fax/lib/faxemd

FAX_TMP=$WORKDIR/faxout.tmp  # The last body part of the fax
HDR_TMP=$WORKDIR/header.tmp  # The header info for the fax

```


LISTING 1 *Fax Request Server Script, continued*

```
rm -f $FAX_TMP
# cat - > $FAX_TMP
$PCL_CONV > $FAX_TMP

# convert senders OpenMail address to UNIX mail format, so fax/ux can send
# an acknowledgement email message to the senders OpenMail mailbox

rm -f $HDR_TMP
M_SENDER=`echo $OMSENDER | awk '{print $2, $1 $3}' | tr " " "_" | tr "," "_`

# build the fax/ux header file
(
echo "From $M_SENDER ``date`
echo
echo "FROM: $FAX_SENDER"
echo "STYLE: Basic (High Res)"
echo "CLASS: Standard"
echo "ACCOUNT: Sample"
echo "SUBJECT: $OMSUBJECT"
echo "TO: $FAX_RECV"
echo "FAX#: $FAX_NUMBER"
echo "ATTACH_FILE: $FAX_TMP"
echo "END:"
) > $HDR_TMP

## Example Header #####
#
#From Rangan_Kumar/hpnz_pso Wed Jan 5 16:00:52 NZDT 1994
#
#FROM: Kumar Rangan
#STYLE: Basic (High Res)
#CLASS: Standard
#ACCOUNT: Sample
#SUBJECT: Test Message
#TO: John Doe
#FAX#: 3843380
#ATTACH_FILE: /tmp/faxout.tmp
#END:
#
## Example Header End #####

# now hand it to the fax-email daemon ...
rm -f /tmp/faxlp.lock

### original statement from "faxlp" #####
# faxemd 1 0 ' ' /tmp/faxlp.in.q' /tmp/faxlp.err' "$tfile" '/tmp/faxlp.lock'
#####

$FAX_PROG 1 0 ' ' /tmp/faxlp.in.q' /tmp/faxlp.err' "$HDR_TMP" '/tmp/faxlp.lock'

R_CODE=$?

# acknowledge processing of request ...
echo "Your fax message : "
echo "subject: $OMSUBJECT , for: $FAX_RECV , on Fax#: $FAX_NUMBER,"
echo "was received and processed at the ``hostname`` Fax Gateway,"
echo "at `date`"
echo "Return Code from the Fax Server was $R_CODE"
```


OMSENDER Sender's name (Given & Surname) and mailnode
 OMRECIPEA Foreign address field of recipient's information

■ Last body part of the message

To access the Request server to send a fax using our fax script, use the following format:

```
fax +req/ou1, ou2,ou3,ou4(Name@fax_phone_#)
```

Subject: _____

The Foreign address field typically looks like: *name@host.domain.organization*. In our case, we will provide the recipient's name and fax telephone number separated by an "@" sign.

Example:

```
From: Dee Wallace/hp,piscataway
To: fax +req/hp,fax(Tony Jones@9,15555626246)
Subject: Directions to stadium
```

Here are the directions to the stadium:

```
1] ...
2] ...
3] ...
```

Good luck,
 Dee

Refer to the "fax" script in *Listing 1* to see a sample of how to integrate OpenMail and HP 9000 fax. Note: The script is a prototype to show proof of concept. Additional error checking and enhancements should be added before this is employed in a production environment.

How to:

Interface Existing Applications to HP 9000 Fax

Use the electronic mail interface

Use the *lp* printer interface

The application can mail output to the fax server or print output to a destination printer that is being simulated by the fax server. If the application uses the mail method, the cover

sheet parameters should be listed in the beginning of the message. If the application is using the *lp* printer interface, the cover sheet parameters must be specified in the *lp* command line. Refer to the fax printer model script for more information on how to invoke the *faxemd* process.

Electronically Mail Application Program Output

Programs can use the command line interface to send program output electronically. For example, to send a report file *report.out* to a user called Tony Jones:

```
omsend -t "Tony Jones" -s "FY'94 report" -a "report.out"
-u $USER -p $PASS -q
```

The *-s* option is the subject, the *-u* and *-p* options are for the OpenMail user and password.

Integrate Existing Applications to Derive New Solutions

Summary of OpenMail to Fax integration

Find common interfaces:

Electronic mail interface

lp printer command

Command line interface

Select an interface that is reasonable to work with given constraints such as available environment variables provided by the OpenMail request server.

Find documentation covering interfaces.

Format the information in a form that is recognizable to the appropriate process, such as *faxemd*.

Use the OpenMail Request server to allow user to send a fax.

Format information into required files for *faxemd*.

Pass the files to *faxemd*.

User should expect to receive two mail messages after sending a fax.

Acknowledgments

I would like to thank Stefan Buerger and Kumar Rangan of the HP Professional Services Organization for providing the foundation for the fax request server script. ■

Tony Jones is a technical consultant with HP's Professional Services Organization in Piscataway, New Jersey. He has been involved with systems integration, client-server implementations, and migration planning and design for 14 years. Jones specializes in assisting customers to use their existing equipment more effectively by integrating various components.

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CIRCLE 121 ON READER SERVICE CARD

by David Totsch

File Name Generation: Korn Shell Composite Patterns

WITH SUCH A LOFTY TITLE, this column sounds like an adaptation of a graduate student's thesis. Relax. It is much more basic than it sounds. You already know and make use of the File Name Generation part: you run commands like `ls -l *.txt` or `cat data? > itall`. You probably use many of the patterns described in *regexp(5)* under Pattern Matching Notation without even thinking. The Korn shell adds its own flair to the situation by adding Composite Patterns to the mix.

Composite Patterns allow you to use groups of file name generation patterns. Let's say you have a directory that contains the following files:

<i>four.blob</i>	<i>four.tic</i>	<i>four.tok</i>
<i>four.txt</i>	<i>one.blob</i>	<i>one.old</i>
<i>one.one.tok</i>	<i>one.tic</i>	<i>one.tok</i>
<i>one.txt</i>	<i>three.blob</i>	<i>three.old</i>
<i>three.tic</i>	<i>three.tok</i>	<i>three.txt</i>
<i>tok</i>	<i>two.blob</i>	<i>two.old</i>
<i>two.tic</i>	<i>two.tok</i>	<i>two.txt</i>

If you want to work with all of the *two* and *four* files that have the *blob* and *txt* extension, you have a dilemma. You can list all of the two files with `two.*`, but you get more than you wanted (*two.old*, *two.tik* and *two.tok*). Using the Korn Shell's Composite Patterns, you could use:

```
@(two|four).@(blob|txt)
```

and then you get just what you wanted:

```
four.blob four.txt
two.blob two.txt
```

Here are the Composite Patterns that the Korn Shell recognizes:

<code>?(pattern_group)</code>	Match one or zero
<code>*(pattern_group)</code>	Match zero or more
<code>+(pattern_group)</code>	Match one or more
<code>@(pattern_group)</code>	Match one
<code>!(pattern_group)</code>	Match exceptions (opposite) of @

where *pattern_group* is a pipe-delimited list of file name generation patterns. Therefore,

```
@(two|four).@(t??|blob)
```

matches

```
four.blob four.tic
```


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CIRCLE 178 ON READER SERVICE CARD

four.tok four.txt
two.blob two.tic
two.tok two.txt

Note that one of the patterns ("t??") is a normal file name generation pattern matching notation that matches the letter 't' followed by any two characters. So far, we have been working with the @ meta-character, which matches exactly one of the patterns in the given pattern list. That example was straightforward. The other meta-characters are reasonably straightforward, too. Here are some additional examples to get you started:

Composite Pattern

`+(one.|two.)tok`

`*(one.|two.)tok`

`?(one.|two.)tok`

`*.tok`

`@(one|two).tok`

`!(one|two).tok`

Matches

one.one.tok one.tok

two.tok

one.one.tok one.tok

tok two.tok

one.tok tok

two.tok

four.tok one.one.tok

one.tok three.tok two.tok

one.tok two.tok

four.tok one.one.tok

three.tok

These Composite Patterns make it possible to match file names that might normally generate frustration—frustration that usually manifests itself in executing a command multiple times to manipulate all of the files you intended to access. Instead of writing several lines of shell script in a file clean-up routine, you might be able to remove them all with just one *rm* command. Now, using the Korn Shell's composite patterns, you can specify more succinctly the files you want. ■

After serving several different organizations over the past seven years as a system administrator with various flavors of UNIX, David L. Totsch still enjoys the profession. He also enjoys discussing UNIX with just about anyone. At present, he is working with HP-UX systems and wide-area networks for a Fortune 100 company in the Piedmont area of North Carolina. He can be reached via Internet: dtotsch@wfu.edu.

by Lisa Zahn

ICAEN

ON SITE IS A NEW COLUMN devoted to exploring system administration at typical HP-UX sites. Each column presents an interview with a lead system administrator, in which we'll discuss the site's network, systems, and application environment, the choices that led to the configuration, the roles and responsibilities for network, systems, and application management, and the mechanisms used to administer the site.

This column profiles the University of Iowa's College of Engineering. I spoke with Matthew J. McLaughlin, systems administrator for Iowa Computer Aided Engineering Network (ICAEN).

OS: How is your support organization structured?

ICAEN is a separate department in the College of Engineering. Our charter is to provide computer support to the Engineering College's student body, office staff, and faculty. We support the College's seven other departments as well as the dean's office staff and seven student laboratories.

OS: How many of you are there, and how do you assign responsibilities?

Our staff consists of six system administrators and the department head. We support approximately 2,130 users, of whom 1,200 are undergraduate students, 400 are graduate students, 40 are office support staff, and 130 are faculty.

We organize our staff responsibilities around areas of expertise: HP-UX, Domain, Macintosh, user accounts and commercial application installation, user services, such as our help desk, and ICAEN database administration.

OS: What administrative areas do you support?

The ICAEN staff takes care of all workstation and personal computer system maintenance, such as loading, patching,

and fixing security holes. We maintain the physical network topology as well as the "logical" network, which in our environment means managing TCP/IP, IPX, and AppleTalk. We are responsible for the security of user accounts, enforcing data protection, and building and maintaining firewalls.

We handle the Engineering College's commercial application installation and maintenance, and we are also responsible for installing public domain software. However, we determine which applications we will and won't support, based on whether or not the package will benefit the majority of our users. If the package is useful to only a small number of users (or a single user, which is often the case), we install it into our `/usr/local/yo-yo` directory, where "yo-yo" stands for "you're on your own."

We also manage the College's communications software, except for student, office staff, and faculty dialup, which the University Computer Center provides. And, our staff is responsible for backing up all machines on site, although users can make their own copies of files to DAT drives in the student labs. In general, we tightly control user administrative access. Users are permitted to manage their home directory, but are not allowed to do any other machine administration.

OS: What types of applications are run in your environment?

As an Engineering College, we support all types of engineering software, as shown in *Table 1*.

OS: What kind of computers and operating systems do you support in your environment?

For UNIX, we chose to stay with only one UNIX vendor—HP—to maximize our ability to support our system. We did

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CIRCLE 24 ON READER SERVICE CARD

the same for PCs and support only Apple. We supply a level of network support for a mix of UNIX types as well as DOS-based computers. We also support Mac, DOS, and Windows compatibility software.

The engineering lab equipment consists of approximately 53 HP 9000 Series 700 workstations, which run either HP-UX 9.03 or 9.05, 55 Apple Macintoshes, which run MacOS version 7.5.1, and 28 HP/Apollo DN400 workstations. We are currently converting the DN400s to run as X terminals that boot off the Series 700s. The unconverted 400s run Domain/OS 10.4; the X terminals run HP-UX 9.03. The chemical engineering and hydraulic labs each have about five machines; they're either HP 9000 Series 715 or older Macs, like IILC or IISI. For the most part, faculty members either have a workstation or a Mac.

OS: Can you describe a typical desktop system or systems in your environment?

We have three "typical" desktops: the lab desktop, faculty/staff desktop, and research desktop. Table 2 describes each type and approximately how many we have. We also support non-workstation platforms on the desktop, but to very limited extent. For example, we have several older Macs on term servers and about five X terminals in addition to the ones we're creating from DN400s.

OS: Does your environment use central file servers and compute servers for shared resources or is your environment widely distributed?

We are set up as a highly client-server design. All files and most applications are on central servers, with additional servers for the ICAEN database and other special activities like e-mail. Our server machines are Series 735/99s with 80 MB, which we're upgrading to 144 MB, and a 1-GB boot disk.

Almost all of the client workstations have exactly the same configuration, which allows us to administer many more workstations than we otherwise would be able to manage. It also allows us to repair a dead workstation quickly.

Some users have purchased local disks for extra data, but in general, all data is on the central servers, which are on an FDDI ring. We store *no* personal files on the clients. This approach gives us ease of administration and backup, and ease of access everywhere without having to set up an NFS cross mount web. We can do backups easier and faster, and are able manage our disk space with much less hassle.

We have spent many dollars setting up a switched 10baseT network so an Ethernet network could be functional in this heavy client-server environment. We are looking forward to getting rid of the debilitating collisions of Ethernet, and going to 100VG as it becomes more available.

OS: What does your network look like?

Our physical wire configuration consists of fiber to the file servers, Ethernet CAT5 10baseT lines to HP hubs, some ThinNet (10base2), and seven miles of Apollo Token Ring, which will soon be removed.

A Cisco router provides a route to the University Computer Center, and then to another Cisco router that connects to T1 lines to provide Internet connectivity. Our local router connects to our 3COM Lanplex 5000 switched Ethernet hub. This bridges to our FDDI single attached stations using the 3COM hub as the FDDI concentrator. The FDDI loop connects all of the file and application servers. The FDDI is at 100MBit/sec and the switched Ethernet is at 10 MBit/sec. Each switched Ethernet line connects to an HP 12-port hub, which in turn connects via 10baseT (category 5 4-pair UTP copper) to each workstation. Some of the longer hub

TABLE 1 *Application Package Support*

APPLICATION	PACKAGE
MCAD	ProEngineer
ECAD	Mentor Graphics
finite element analysis	ANSYS
office automation	Interleaf, Island Office suite
drafting	CAD3D, Softbench
database	Informix
analysis	Matlab, Mathematica
network administration	OpenView with Node manager, Interconnect manager, and Omniback
emulation software	SoftPC, MAE
MAE, control analysis	Easy5
numerical analysis	IMSL subroutines
visualization	Exponent Graphics

TABLE 2 *Typical ICAEN Desktops*

	TYPICAL LAB (50)	TYPICAL FACULTY/ STAFF (80)	RESEARCH (30)
Model	715/50/75/100	705/710	735/125
RAM	32 or 64 MB	32 MB	128 and up
Monitor	Color	Grayscale	Color up to 24Z
Disk	1 GB disk	400 MB	2 GB and up

runs are on fiber optic cable and the rest are on 10baseT. We have fiber runs to our remote buildings and we support a terminal server for ICAEN staff, which supports SLIP and PPP for when we work from home.

OS: How do you authenticate your users on your networked computers?

We provide a site-wide registry of users and maintain it with the DCE security server; we have 3000 plus accounts, so hand editing and copying passwd files is way too much work. We have just come up on the latest version of HP's DCE product, and have just moved from the Domain registry to the DCE security server. We've set up an Informix database application to manage account creation, deletion, and changing; we create and delete some 600 accounts per semester.

OS: Do you do any password checking? As of now, we run a password check-

ing utility like "crack" on an ad hoc basis, but we have plans to implement this for every password change to the system. We "age" passwords every four months, and we require a minimum password.

OS: What's your printer environment and how do you manage it?

We hook printers to desktop stations in offices and hook them to the network in the labs, where a central node does the processing and spooling. We're updating our old printing system to the SharedPrint spooler product and we're also working to get all of our printers directly connected to the network. The Informix database will manage each user print quota as well as do page accounting through SharedPrint.

OS: Can you describe your backup strategy?

We perform one full and one incremental weekly backup, and keep five

rotating sets. These backups are for disaster recovery; we do two archivals per year, once in January and once in August. We presently use DAT as our backup media, and we are working on a DAT auto loader setup for weekly full backups as well as a magneto-optical jukebox for incremental backups between the full backups.

OS: Finally, what communication services do you support between your users and between your users and their associates?

We provide the full range of Internet services to our users, including e-mail, terminal services and sessions, file transfers, World Wide Web access, news, notes, and INN. We do not support internal mail gateways to PCs, since PCs are not a significant part of our environment.

ICAEN provides special dialup and modem access from home for our staff, because it's faster and easier to work from home on problems that come up during off hours. The rest of the users (including faculty, office support staff, and students) share a University-supported dialup/modem pool that the University Computer Center manages.

We support *sendmail*/SMTP for internal mail, since it's a support-free and configurable part of UNIX and a de facto standard. The University Computer Center supports POP mail users. We don't support x.400, and we currently have very little reason to spend money or time to convert to it. ■

Lisa Zahn is vice president of Ibis Communications Inc., a technical documentation and training consulting firm. She was one of the first five technical writers at Apollo Computer, Inc. and was a Learning Products manager at HP's Chelmsford, Massachusetts facility for several years before forming Ibis.

THE LAST FEW MONTHS have been somewhat quiet on the Net. There were some good contributions, but many of them weren't really platform-independent. For example, I saw a really nice network probing tool, but it worked only on Sun and SGI hardware. If I see that someone has tackled the conversion to HP, I'll mention it in this column.

COMP.WINDOWS.X

ddd

On occasion, announcements of new software are made in "nonstandard" newsgroups (that is, newsgroups that don't post sources). A good example is *ddd*, the Data Display Debugger, a graphical front-end for GDB and DBX debuggers developed by Dorothea Luetkehaus and Andreas Zeller at the Technische Universität Braunschweig in Germany. The software is available from a number of different sites. The current version is 1.2. In North America, try accessing sites <ftp.x.org/contrib/utilities/> or <ftp.crl.research.digital.com/pub/X11/contrib/utilities/>.

In Europe, try <ftp.denet.dk/pub/X11/contrib/utilities/> or <nic.funet.fi/pub/X11/contrib/utilities/>.

If this program had been nothing other than a graphical front-end to *gdb*, I would not have recommended the software. Fortunately, it is a lot more. You can view source lines and breakpoints in a separate window, but *ddd* also displays data as graphs. This is similar to a feature that the commercial program *Insure* offers. As the program's announcement file states, "A simple mouse click dereferences pointers or views structure contents. Complex data structures can be explored incrementally and interactively, using automatic layout if preferred. Each time the program stops, the data display reflects the current variable values. Using *ddd*, you can reason about your application by viewing its data, not just by viewing it execute lines of source code." For power programmers, a command interface exists. For button pushers, there is an ample set of buttons for operating the software.

Not only does *ddd* work with C programs, it also supports C++, Pascal, and Modula-2. And best yet, it works on all my platforms: Solaris, SunOS, HP-UX, and AIX (actually it works with many other platforms, too, including Linux). Unfortunately, it does not support HP's *xdb*. But for those people using *gdb* (see below), this is a nice add-on. If you're not familiar with *gdb*, this is the Free Software Foundation's debugger (they are the makers of *emacs* and the *gcc* C compiler). Try using it. It's fun.

xbmbrowser

Do you have a collection of X bitmap and pixmap files? Are you constantly trying to figure out what each file looks like? This program presents a graphical display of all such files in a directory and allows a user-defined action to be performed on them. This program was originally written by Ashley Roll and is currently supported by Anthony Thyssen in Australia. Thyssen lists two sources for the package:

<ftp.x.org/contrib/utilities/xbmbrowser4.4.tgz>

<archie.au/X11R6/contrib/utilities/xbmbrowser4.4.tgz>

Building and installation instructions are found in the README file. Running *xmkmf*

followed by *make* built the package for me.

Let's say you don't have any bitmap files. Would you like some? Look at the next item.

picons

If you like the idea of a browser for *xbm* graphical images but don't have any images, then this is the package for you. Picons is "Personal ICONS"—libraries of small images that can be used to represent users and domains on the Net. Additional pictures include Usenet newsgroups and weather forecasts. The picons come in monochrome XBM format or color XPM and GIF formats. The seven databases contain over 22,000 picons! The majority of the database consists of the Usenet images—19 MB worth! Read the various README files associated with this package. Included are a number of support files and documentation. Also included is an archive of software that can use the picons: mail reads, monitoring programs for mail, news, printers, systems, etc.

The picon package is maintained by Steve Kinzler. It can be found via ftp at <ftp://ftp.cs.indiana.edu> in directory */pub/faces/picons*. If you have Web access, then go to <http://www.cs.indiana.edu/picons/ftp/index.html>.

Everything is well documented there.

Let's assume you downloaded the bitmap and pixmap images. What can you do with them? So many pretty pictures and no application to use them on. Well, let's move on to the next goody.

xfaces

Xfaces is a program that will display an image for each piece of mail in your mailbox. By including files from the picon library above, you can have a very attractive display graphically showing who has sent you mail. If you really want some-

thing neat, digitize pictures of each of the employees at work and add those pictures to the faces database. Then when John Doe sends you mail, his picture will automatically appear in the *xfaces* window.

I had heard about this program but it wasn't till I saw my co-worker, Chris Liebman, using it that I wanted a copy on my monitor, too. That was when I found out that Chris was the author of *xfaces*.

I obtained the program from the same location as the picons database. Directory */pub/faces/xfaces* contained the binary file *xfaces-3.3.tar.Z* as well as a number of patches. I applied the patches by using the patch program (obtainable via ftp from [gatekeeper.dec.com:/GNU/patch-2.1.tar.gz](ftp://gatekeeper.dec.com:/GNU/patch-2.1.tar.gz)). You need to modify the file *Imakefile*, defining or undefining the features you want enabled or disabled. You should enable the XPM (called *USE_XPM*) feature but this requires the xpm library. The xpm library contains procedures for storing and retrieving X pixmaps to and from files. I have previously referred to this library when describing the program *xsokoban* (*hp-ux/usr*, May, 1995). The latest copy can be found in at <ftp://crl.research.digital.com> as */pub/X11/contrib/libraries/xpm-3.4f.tar.gz*. Build this library before building *xfaces*.

Building *xfaces* is easy. Enter *xmkm* followed by *make install*. Modify the *XFaces.ad* file and place it as *XFaces* in your home directory. Sit back and watch the mail come in. It will take a little time to tailor the application to your needs, so have patience with it.

pixmap

While this is not a new utility, I thought I should share this program with you if you had any thoughts about taking seriously the *xfaces* packages described above. Specifically, *pixmap* is a

pixmap editor similar to the bitmap editor, *bitmap*. Make sure you have the xpm library (see above) installed before you install this program. Building the software is easy. Run *xmkmf* followed by *make*. Before you make the package, however, you should decide whether you will want a Motif or Athena version of *pixmap*. If you don't understand the previous sentence, choose Motif.

The software is available from [ftp.x.org](ftp://ftp.x.org) in directory */contrib/applications/pixmap* as file *pixmap2.6.tar.gz*. If you can't find it there, it is available on most archives that maintain X sources.

ALT.SOURCES

kplib

This library is for the C++ programmers amongst us. *Kplib* is a C++ class library that contains all sorts of combinations of lists, iterators, sets, stacks, queues, bags, and strings. It works with the GNU *gcc* 2.6.x compiler and may work with other compilers, too. It is a small, powerful package using templates and comes complete with adequate documentation. The author, Keith Pomakis from Canada, also has a generic C list library. Both packages are available from the author via WWW at <http://esclub.uwaterloo.ca/u/kppomaki/>. The software is not available via anonymous ftp (at least not from that site—I didn't check other locations). If you would like this package and don't have WWW access, send me e-mail. I'll *uuencode* the gzip version and mail it to you (the uuencoded file is 32,003 bytes long).

GNU Stuff

rcs

The Free Software Foundation (FSF) has been busy. A number of new versions

of their software have been released recently. For programmers, there is now a new version of the Revision Control System. Version 5.6 has been out in the field for a couple of years. FSF has just announced the release of Version 5.7. This version includes fixes to lots of bugs and includes support for binary files. For those not familiar with *rcs*, this package is conceptually similar to the standard *scs* (Source Code Control System) package available on all UNIX systems.

Personally (and this is subjective), I found *rcs* to be much easier to use than *scs*. Ten minutes of playing with the software was all that it took. I was then able to archive sources, checking them out and in without any problems. Even single source file programs can benefit from being administered from within the *rcs* environment.

gcc

A just-released update is to the new *gcc* C compiler version 2.7. I'm not convinced I would actually get it yet since typically a second release appears shortly after the first release (Version 2.6.1 came only a week or two after Version 2.6). Nevertheless, it is out and by the time you read this announcement, the compiler should be in good shape. At Landmark, we have come to rely on *gcc* for our various UNIX-based products. This compiler provides us with a consistent compilation flow (syntax checking) that works on all of our platforms (SunOS, Solaris, HP-UX, and AIX).

emacs

Last but not least, FSF has released a new version (Version 19.29) of their famous editor, *emacs*. You don't have to be a programmer to use *emacs*, but minimally you should consider yourself

to be a super-power user. Anything less just won't cut it. This version of *emacs* supports Windows NT and includes a number of display enhancements including the ability to use more than one X display at a time. It also has a mode that helps you recover all files you were editing at the time of a crash. In a column of this size, I couldn't even begin to describe *emacs*. There are a number of books available about *emacs*, including the FSF reference manual and an O'Reilly Publishing book.

For HP-UX users your best source for GNU software is an ftp site called jaguar.cs.utah.edu. This site maintains not only GNU sources but also HP-built binaries. This is especially important for people using *gcc* since the standard *gcc* software does not work on HP systems. It is possible that with *gcc* v2.7 this problem has been fixed, but I have not verified it yet. Binaries maintained are only for versions of HP-UX 9.01 and up (using the PA-RISC 1.1 architecture) and are dynamically linked.

WWW

Among the WWW home pages I have saved as bookmarks are a few that are specifically oriented to HP. By using these as starting points, you can glean lots of information on HP hardware and software.

<http://www.wsg.hp.com/>

This is the home page for HP's workstations. There is a lot of "advertising" here but even that is interesting. Do you want to know about the new HP 9000 model 715/XC? Technical as well as graphical specifications are viewable. Just because the title of the home page is workstation-oriented, don't think that non-workstation information cannot be found here. Hypertext links to server

information are just a mouse click away—including the new HP 9000 K-Class servers. Press releases and support service information are also available.

<http://www.hp.com/home.html>

This Web page, "Access HP," is loaded with great information. From here, for example, you can "jump" to the HP Lab World Wide Web page. Among some of the neat things to be found here are copies of HP technical reports. Abstracts as well as PostScript-ready full-text reports are available for downloading. HP-specific search engines can also be searched for particular information. For example, I entered "pa-risc and manual" and got 60 hypertext hits. One was a pointer to the PA-RISC Architecture and *Instruction Set Reference Manual*, which I could have downloaded as a PostScript file.

<http://www.unitedmedia.com/comics/dilbert/>

When you get tired of cyber-surfing through HP land, a "must" location is The Dilbert Zone. This is where Scott Adams lives. His Dilbert comic strip can be found here as well as a two-week archive of previous cartoons. I think I go to this http location more than any other on the Internet. It could be because Adams uploads a new comic every day. They are so good. ■

Joe Berry is a senior software developer at Landmark Systems Corporation in Vienna, Virginia. He is one of the authors of Landmark's performance monitor, TMON for UNIX. A former HP 3000 systems specialist for Hewlett-Packard, he has been in the computer industry for more 20 years. He can be reached at joe@landmark.com.

by Larry Headlund

Any Port

X TERMINALS HAVE PORTS on the back. More specifically, the HP Envizex and Entria X terminals have a parallel and one or two serial ports. The parallel port cries out for a local printer, but what do you do with the serial ports?

One popular use is to attach a modem and do local callouts or use it as a SLIP connection. You can also make a local-connection character connection through the serial port with the X terminal software itself, never involving the OS of the host machine. Emulate a VT100 with more raw compute power than was used to put a man on the moon (allowing for exaggeration for dramatic effect).

Another thing you can do is attach a serial printer. Like the parallel printer, this setup can be done through SAM and there is no way I could get a column out of that, but I had something more exotic in mind.

My problem was this: I had some serial barcode scanners. In a retail Point of Sale application the users wanted to be able to scan a barcode tag and use that information just as though they had typed it in. This is a very common request. So common that there is specialized hardware that attaches to the keyboard and mimics keyboard input from a scanner. So common that many plain-character terminals have a second serial port and a setup mode so that anything coming down the wire looks like keyboard input to the OS the terminal is connected to. So common that the example for setting up an *X*devices* file in *Using the X Window System* (pages 3-12 to 3-17) even mentions a barcode reader. So I should have no problem, right?

Right.

After reading the fine manual and seeing no obvious way to proceed, I did what any self-respecting programmer

would do: I went to the Internet for help. The responses from Tony Kruse of Ford Emissions Lab, Chuck Tomasi of Technology Group Inc., and Christopher Hudel of Hewlett-Packard (Panacom Division) made this article and, more importantly, the successful completion of the application, possible.

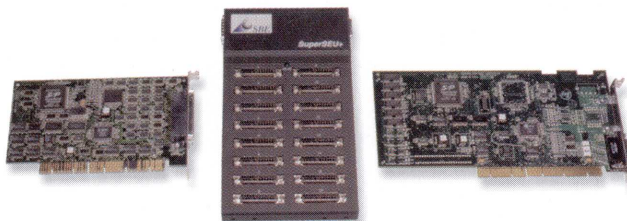
Some barcode readers hook up to either the keyboard or through the HIL, which make all this transparent. Unfortunately, the barcode readers I had were not of the HIL type, but plain old RS-232. I'm not sure that even if I had known in advance of the problem and had had complete control over purchasing, I would have gotten the specialized HIP readers. HIL is a standard, but not a wildly popular one. And there is something to be said for using the same hardware at the user level as widely as possible, and allowing the greatest range of choices for hardware. With RS-232, the same barcode scanner could connect to the system through a port in the wall, through the back of a character terminal, or to a portable device. Anyway, I was not about to admit defeat and say there was something the X terminal couldn't do that looked at least physically possible.

There is some good news and some bad news about the serial ports. The bad news is you cannot, at this time, put a device inputting through the serial port on a par with the keyboard or mouse just by setup of the X terminal itself and manipulations of the *X*devices* table. (This may become possible in the future. Real Soon Now is the operative phrase.) More bad news flows from this in that any program that wants to deal with these serial ports has to know about them, and has to contain code to deal with them. Unlike an HIL device, access



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CIRCLE 29 ON READER SERVICE CARD

LISTING 1 *Basic Socket Reading*

```

#include <errno.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <netdb.h>
#include <sys/types.h>
#include <netinet/in.h>
#include <unistd.h>
#include <sys/socket.h>
#include <sys/fcntl.h>
#include <sys/ioctl.h>
#include <time.h>

#define TCP 6

#ifdef _NO_PROTO
static int intConnectToServer(strServer, intPort)
char* strServer;
int intPort;
#else
static int intConnectToServer(
char* strServer,
int intPort
#endif
{
    struct hostent* data;
    struct sockaddr_in addressSocket;
    int status;
    int intChannel;

    /* Create a local socket. */

    if((intChannel = socket(AF_INET, SOCK_STREAM, TCP)) < 0){
        perror("Unable to create network socket.\r\n");
        return(-1);
    }

    /* Get the host IP address. */

    if (!(data = gethostbyname(strServer))) {
        perror("Unable to find host in host table\r\n");
        return(-1);
    }

    /* Set up the IP address parameters and try to connect to the server. */

    addressSocket.sin_family = AF_INET;
    addressSocket.sin_port = htons(intPort);
    (void)memcpy((void*)&addressSocket.sin_addr,
        (void*)data->h_addr_list,
        data->h_length);

    if ((status = connect(intChannel,
        (struct sockaddr *) &addressSocket,
        sizeof(addressSocket))) < 0) {
        perror("Unable to connect to network socket");
        return(-1);
    }

    (void)fcntl(intChannel, F_SETFL, O_NONBLOCK);
    return(intChannel);
}

```


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CIRCLE 184 ON READER SERVICE CARD

LISTING 2 Adding Input from the Serial Port

```

static Widget      widgetTarget = (Widget)0;

#ifdef _NO_PROTO
static void barcodeInput(client_data, fid, id)
XtPointer          client_data;
int*                fid;
XtInputId*          id;
#else
static void barcodeInput(
XtPointer          client_data,
int*                fid,
XtInputId*          id)
#endif
{
    if (*fid > 0) {
        char  strData[20];
        int   nbytes = read(*fid, strData, sizeof strData);

        if (nbytes != -1) {
            int i;

            nbytes = (nbytes == sizeof strData ? nbytes - 1 : nbytes);
            strData[nbytes] = '\0';
            XmTextSetString(widgetTarget, strData);
            if (XtHasCallbacks(widgetTarget,
                                XmNactivateCallback)
                ==
                XtCallbackHasSome){
                XtCallCallbacks(widgetTarget,
                                XmNactivateCallback,
                                (caddr_t)0);
            }
        }
    }

#ifdef _NO_PROTO
static void barcodeInputSetup(appContext)
XtAppContext appContext;
#else
static void barcodeInputSetup(
XtAppContext appContext)
#endif
{
    char*      strServerName = strtok(getenv("DISPLAY"), ":");
    static int  fid;

    if ((fid = intConnectToServer(strServerName, 9100)) > 0) {
        XtAppAddInput(appContext,
                        fid,
                        XtInputReadMask,
                        barcodeInput,
                        NULL);
    }

#ifdef _NO_PROTO
static void barcodeInputInitCB(w, unused, ignored)
Widget      w;
caddr_t      unused;
caddr_t      ignored;
#else
static void barcodeInputInitCB(
Widget      w,
caddr_t      unused,
caddr_t      ignored)
#endif
{
    barcodeInputSetup(XtWidgetToApplicationContext(w));
    widgetTarget = w;
}

```

is not transparent to the application. The good news is there are a couple of ways to access the serial ports.

The first way is through the program *hpnptyd* and this is the method HP uses to run a serial printer out the X terminal's serial port. This method is based on our old friend the FIFO file. A FIFO file is created in the */dev* directory and is treated by other programs just like any other character device file. A daemon program is started to transfer anything written into the serial port to the FIFO file and vice versa. If you had programs already written that used device files, this would be the way to go. Do a man *hpnptyd* if this approach appeals to you.

You will also find example code in the form of the shell script that controls this type of printer setup.

The Net also provided information if I wanted to proceed at a more fundamental level in the form of the correct addressing to treat these ports as sockets. Suppose your X terminal has the name *red* in the */etc/hosts* files. Then you could access the first serial port with the combination *red 9100*. (The second serial port would be *red 9102* and the parallel port *red 9101*.) For example, you could test communications by doing a telnet *red 9100*.

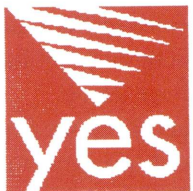
Proceeding at the socket level appealed to me because I had just come off writing some communication programs to access the ports of an Ethernet terminal server in ways and for purposes the manufacturer of the terminal server said were not possible. The low-level code for accessing the X terminal ports would be identical. The best code is that which is already written, tested, documented, and debugged. This fundamental code is in *Listing 1*. Note that in cases of socket error the functions

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CIRCLE 152 ON READER SERVICE CARD

call *perror*. The behavior of *perror* is to print its argument to *stderr* and exit. If you wish other behavior—for example, not to do an exit—write your own *perror* function and link it ahead of *perror*.

With the lower level stuff out of the way, I was ready to proceed with the application-specific code. The two main cases I had to deal with were legacy character-based applications and fresh X/Motif applications. The character applications were run inside an *hpterm* window. Because of the state of the machine I was on (HP-UX 9.x) and the code I had available, my only option was to hack the MIT X11R5 *xterm* source to add reading from the X terminal's serial port.

The *xterm* source has a famous "Here be dragons" warning message to potential source hackers. They are not kidding. The *xterm* program was an early X application that does not use

the Xt libraries. So you don't do something simple like use *XtAppAddInput()*, oh no. The code is not based on a Term widget with some clear places to add code. It is an ugly job of tracing execution and an uglier series of hacks to get the results. When I rewrite this using a term widget, I will share the results with you, but I don't think you would like to see the current state, at least not on a full stomach.

The X programs were Motif-based, so I could use the elegant Xt functions. This code I am not ashamed to show and is on display in *Listing 2*. The implementation in a program is very simple. The *XmText* widget receiving input from the serial port calls *barcodeInputInit* once after creation and that's that.

The way I have coded this places some restrictions on use. Only one program has exclusive access to the serial port. Within that one program the input

from the port goes to one widget. These restrictions didn't inhibit my use of the code and could be worked around with little effort.

It would be interesting to code this so it acted like the National Language subsystems for multibyte characters, but that is a project for another day. ■

Larry Headlund is president of Eikonal Systems and has been working with commercial UNIX since 1982 and with X since 1988. Eikonal Systems distributes Xtty, a software product which allows Motif programs to be run on ASCII terminals like VT220s. He can be reached at (617) 482-3345 or lmh@world.std.com.



CSL Perspective

AS USERS OF HP-UX SYSTEMS involved in a users group, we are in a unique position to influence the directions that HP and other vendors will be taking in the near future. This influence is brought to bear through the opportunities for interaction with HP at conferences and through the System Improvement Ballot. It is also evident through your involvement in the users group itself. The single greatest influence on HP and the other vendors is the number of users who share a common concern and are willing to make a fuss over it.

If you doubt that statement, just look back a few years at what Interex and its members have accomplished. The mature operating systems, RTE and MPE-V, are now part of the Software Technology Division (SWT), with resources dedicated to improving and stabilizing those platforms. IMAGE/SQL and ARPA services are now a reality on the HP 3000, and HP's new system ordering and configuration system is very near completion. Interex's relationship with HP has also been improving greatly as HP comes to recognize the benefits of tapping into the traditionally loyal customer base. So where are the successes for the HP-UX users? Should there not be the same influence on the Workstation Division or General Systems as there has been in CSY?

What HP and many of the multi-vendor users are dealing with is a fundamentally different marketplace. There are more choices, more options, and a lot more knowledgeable people. There are a lot of diverse ideas on the "right" way to do things, and what dictates a standard. This diversity of opinion can sometimes get in the way of effective advocacy to HP, especially when the ideas clash with marketing strategies and

design goals. It's not just the diversity that is lessening our influence, but also our numbers. But the good news is that our numbers are growing and there are some pretty big names in along with us. The merger with InterWorks as well as our continuing work with other groups is helping us all collectively to raise a more influential voice to the vendors, but we can't just sit by and wait for the turnaround—we must lead it.

The strategic plan of Interex places a significant emphasis on growing the membership by offering new services to the HP-UX community. These services will have a significant online component as more of our members become Internet aware and connected. The struggle is to tailor ourselves to fit the unique needs of the UNIX marketplace with its rapid pace and sometimes conflicting loyalties. We have not always done as good a job as we would have liked; we would like to do better. Here's where you come in.

As Interex is moving ahead, we would like your ideas. Many of the volunteers and board members aren't as familiar as they'd like to be with your business or what services would be helpful and valuable to you. You have a golden opportunity to shape not only the future of Interex but also the future of the HP-UX marketplace. Think of something you do now that you might like to have someone else do, or some information that would significantly improve your effectiveness. Brainstorm a little, be creative. Talk it over with your manager and colleagues. Don't forget to send in that idea either. Use my e-mail address, below, or fax it or mail it to me through the Interex office.

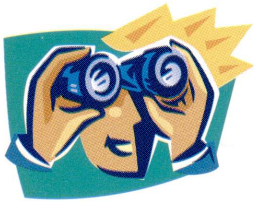
Finally, Interex is pleased to announce that the 1995 release of the

TABLE 1 *Interex Contributed Software Library Release 3522-1995*

NAME	TITLE
diffutils-2.7	GNU diff (file differences)
berkeley-yacc	berkeley-yacc
autoftp	automated ftp scripts for use with MVS
fmp	RTE FMP routines for HP-UX
libnat	RTE library routines in HP-UX native
scsi_info	Display SCSI Device Information
find-3.8	GNU find
grep-2.0	GNU grep
psview-1.41	Postscript previewer
gs-3.33	Aladdin Ghostscript interpreter/previewer
gccpackage	GNU C Compiler/Debugger package
plan.1.4.2	Calendar Management
llnlxftp-2.0.4	LLNL xftp for Motif 1.2
xmcd-1.4	Motif CD player front end
ispell-3.1.18	Spell Checker for UNIX systems
gnuemacs-19.26	GNU Emacs Editor
lynx-2.3	Terminal-based World Wide Web Browser
tripwire-1.2	File Security/Integrity Audit
xtar-1.3.1	X11/Motif version of tar(1)
Mosaic-Windows	Mosaic for Windows 3.1
Mosaic-Mac	Mosaic for Macintosh
xgrabsc-2.3	Capture X-window graphics/save as a file
sudo.v1.3.1	su(1) command with Logging/authorization
ncsa_httpd_1.4.1	HTTP Server (NCSA Version)
cern_httpd_3.0	HTTP Server (CERN Version)
tiger-2.2.3	System security auditing
hpuxsysadmin	Scripts from Marty Poniatowski Denver 94
popper-1.831beta	Post Office Protocol Server
perl-5.001	Perl language and utilities
satan-1.1.1	Security Admin Tool for Analyzing Networks
gs_fonts-3.0	Additional Fonts for ghostscript
Mosaic-2.5	NCSA WWW Browser
gzip-1.2.4	GNU Zip Archive/Compress Utility
xanim-2.69	X Window Animation Movie Viewer
faq	Frequently Asked Questions
xmailtool-3.1.2b	X11/Motif Mailtool (ala SUN Mailtool)
x3270-3.0.3.7	IBM 3270 Terminal Emulator for X
acm-4.5	Aerial Combat Simulator for X11
pcomm-2.0.2	Telecomm program for UNIX ala ProComm
xless-1.7	X Window version of 'less' (a better 'more')
xrolodex-1.2	X Window 'Rolodex' program
aXe-6.1.2	Simple X Window Text Editor

CSL HP-UX is now available. We encountered some delays in creating the release due to resource constraints, but hopefully it will be worth the wait. Some of the software came from the Denver Swap tape, but a good deal of the contributions are new additions to the library. I've included the index in *Table 1*. I would especially like to thank contributors Thomas Treadway, Keith Matlick, Richard Case, Robert Combs, Michael Lampi, and Marty Poniatowski for all their effort in contributing software to the library. Without their efforts, many significant packages would not be available to our members. ■

Paul Gerwitz is chairman of the CSL committee and is a senior technology specialist at Eastman Kodak Company in Rochester NY. He can be reached at 716-477-3067 or e-mail at gerwitz@interex.org or gerwitz@kodak.com



Industry Watch

AH, SUMMER. NOTHING like putting the top down, popping the shades on, and heading out onto that great open highway—the information highway, that is. Lots of new “sites” to see, people to meet, and things to do. Especially this summer.

First stop—PC Expo. IBM parked 35 workstations in its Internet Theater here and put on a net-surfing exhibition. The show demonstrated the latest Internet tools from Big Blue, including OS/2 Warp Connect, which promises a set of integrated networking capabilities for local and remote connections, plus an entrance ramp to the Internet. To power you onto the Net, IBM introduced “superclients” for the superhighway—the PC Power Series and ThinkPad Power Series—claiming the power of a workstation for the price of a PC.

Around the bend, at Digital’s booth, you were lucky to get a parking spot. Behind the lineup of vintage sportsters, Digital displayed its “fleet” of Internet tools, an interactive video kiosk for retailers, and a full complement of new servers, desktop systems, and notebooks. Whatever your speed, Digital claims to have a “vehicle” to get you onto the information highway, with everything from the HiNote notebook multimedia package and MOBILIZER software to high-performance Celebris XL and Starion Pentium PCs.

And now, gassed up and ready to roll, why not go cruising to, say, South Africa? Sun Microsystems is providing the South African Constitutional Assembly with a SPARCserver database server to give people there Internet access to constitutional data. The hope is that people can use online computers installed in public buildings to learn what is being said in Parliament or to better understand

proposed changes to the law and government regulations. Back in the U.S., Digital and Persimmon have teamed up to give us our own “Town Hall” on the Web. An AlphaServer 2100 will be the engine, with customized software and navigation aids provided by Persimmon. The site’s visionaries see it as an alternative source for information and ideas for local communities, businesses, and the larger political arena.

Of course, not everyone is content for a nice leisurely drive through city assemblies and town halls. For some, it’s always gotta be a race; in this case, the competition is for transaction performance. See if you can flag the winner in this lineup:

Among the eight-processor SMP contenders, IBM has posted 3119.16 tpmC for its RS/6000 Model J30 versus 2660.03 tpmC for the Bull ESCALS D401/8, 2616.20 tpmC for HP’s 9000 Model K400, 1708.12 tpmC for Digital’s Alpha 2100 4/275, and 1063.90 tpmC for Sun’s SPARCserver 20. For a 12-way system, Digital is dropping hints that it will soon report better than 9000 tpm for its AlphaServer 8400 5/300, but as of this writing, the official benchmark results have not been released. ■

Industry Watch is written by James H. Gamble.

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 725/75, 20" Color, 32 Mb, 1 Gb Disc
 720 CRX, 19" Color, 16 Mb, 525 Mb Disc
 730 CRX, 19" Color, 32 Mb, 525 Mb Disc
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 A2513A, 64 Mb for 720, 730, 735, 750, 755
 A2512A, 32 Mb for 720, 730, 735, 750, 755
 A1979A, 16 Mb for 720, 730, 735, 750, 755
 A2829A, 32 Mb for 712/60, 712/80
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CIRCLE 52 ON READER SERVICE CARD





HP 1000 Guru

Q: Now that we have a program, A990FWID, that works fine for the A990, how about a version for other A Series? Particularly the A900 so I can tell if I have Rev4 firmware or not.

A: Here you are. There are two sources. FWID.FTN is the main and CHIPS.MAC is the subroutine that calls the .fwid instruction. (See *Listings 1* and *2*.) This program will return the following information:

- CPU type (A400, A600, A700, A900, A990)
- Six lines of revision information for the firmware
- If on an A900, whether the firmware is Rev4 or not

For example, on an A900 with Rev4 firmware, you will see the following:

```
CPU Model is A900
Product #: 0 Octal Revision: 011404
Product #: 1 Octal Revision: 011404
Product #: 2 Octal Revision: 005004
Product #: 3 Octal Revision: 005004
Product #: 4 Octal Revision: 006004
Product #: 5 Octal Revision: 006004
Congratulations, you have rev4 f/w
```

Q: Earlier this year, you described a problem that manifested itself when using revision 6110 of the 12076A LAN firmware. The problem was an NSINIT error:

```
** (4101) NSINIT: Error storing Station Addr. Driver Reports:10.
```

and

```
** (4102) NSINIT: Error Registering MCAST Address. Driver Reports:10.
```

What is the status of this problem?

A: At the time it was believed to be a problem with the 6110 firmware, since the previous 2547 firmware did not exhibit this behavior. Subsequently, it was found that the failure occurred only when the SQE or so-called Heartbeat was not present. SQE is supplied by the MAU and serves as a Signal Quality Error indicator. Some LAN transceivers allow this signal to be turned OFF by the user. Ethernet transceivers typically do not supply SQE.

Continued on Page 82

HP Series

	MB	1	2	4	8	12	16	32	64	128	256
HP-200/310/320		●	●	●	●						
HP-319			●	●							
HP-330/350/370			●		●						
HP-332			●								
HP-340			●								
HP-345/375/380			●	●			●	●			
HP-360			●	●	●		●				
HP-362		●	●	●							
HP-382			●	●			●				
HP-400/425/433			●	●			●	●			
HP-425E			●	●			●				
HP-700RX	●	●	●	●							
HP-705/710				●			●	●			
HP-715/725			●	●			●	●	●		
HP-720/730/735							●	●	●	●	
HP-742/745/747			●	●			●	●	●		
HP-750/755							●	●	●	●	●
HP-8X7/9X7							●	●	●	●	●
HP-FXX/GXX/HXX/IXX							●	●	●	●	●

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CIRCLE 85 ON READER SERVICE CARD

LISTING 1 FWID.FTN

c The .fwid instruction allows a program to obtain a number
 c identifying the processor's firmware revision. On the A900
 c the base set firmware is divided into 6 banks of 1k microwords
 c each. When the .fwid instruction is executed, the B register
 c specifies the bank (0-5) and the A register returns two bytes
 c of identification information. The lower byte contains the ROM
 c package revision and the upper byte contains the revision for
 c the specific bank. The package revision is incremented only when
 c all banks of the firmware are modified. Package numbers 0, 1,
 c and 2 were used for A900s without CDS. The package number was
 c changed to 3 when CDS support was added and changed to 4 for the
 c latest firmware update.

c
 c The Communicator lists the part numbers for all the firmware
 c revisions along with a brief description of the modifications.
 c Previously, there was no way to match the part numbers
 c with the values returned by the FWID instructions. The following
 c table provides this correlation. Bank is the B register input
 c to FWID. The A register output is shown in decimal, octal and hex.

Part Numbers	Bank	Dec.	Octal	Hex
12201-80024 to 29	0,1	7,3	3403b	0x0703
12201-80030 to 35	2,3	7,3	3403b	0x0703
12201-80036 to 41	4,5	7,3	3403b	0x0703
12201-80024,44,26-29	0,1	8,3	4003b	0x0803
12201-80030 to 35	2,3	7,3	3403b	0x0703
12201-80036 to 41	4,5	7,3	3403b	0x0703
12201-80045 to 50	0,1	9,3	4403b	0x0903
12201-80030 to 35	2,3	7,3	3403b	0x0703
12201-80036 to 41	4,5	7,3	3403b	0x0703
12201-80045 to 50	0,1	10,3	4403b	0x0903
12201-80030 to 35	2,3	7,3	3403b	0x0703
12201-80036 to 41	4,5	7,3	3403b	0x0703
12201-80060,53-55,61,62	0,1	11,3	5403b	0x0B03
12201-80030 to 35	2,3	7,3	3403b	0x0703
12201-80036 to 41	4,5	7,3	3403b	0x0703
12201-80060,53-55,61,62	0,1	11,3	5403b	0x0B03
12201-80063 to 68	2,3	8,3	4003b	0x0803
12201-80036 to 41	4,5	7,3	3403b	0x0703
12201-80060,53-55,61,62	0,1	11,3	5403b	0x0B03
12201-80063 to 68	2,3	8,3	4003b	0x0803
12201-80070 to 75	4,5	8,3	4003b	0x0803
12201-80076 to 81	0,1	13,3	6403b	0x0D03
12201-80063 to 68	2,3	8,3	4003b	0x0803
12201-80070 to 75	4,5	8,3	4003b	0x0803
12201-80084 to 89	0,1	14,3	7003b	0x0E03
12201-80063 to 68	2,3	8,3	4003b	0x0803
12201-80070 to 75	4,5	8,3	4003b	0x0803
12201-80090 to 95	0,1	15,3	7403b	0x0F03
12201-80063 to 68	2,3	8,3	4003b	0x0803
12201-80070 to 75	4,5	8,3	4003b	0x0803
12201-80096 to 101	0,1	17,3	10403b	0x1103
12201-80063 to 68	2,3	8,3	4003b	0x0803
12201-80070 to 75	4,5	8,3	4003b	0x0803
12201-80103 to 108	0,1	19,4	11404b	0x1304
12201-80109 to 114	2,3	10,4	5004b	0x0A04
12201-80115 to 120	4,5	12,4	6004b	0x0C04

Continued on Page 81

LISTING 1 *FWID.FTN, continued*

```

FTN7X
    Program fwid

    integer revision,product,cpu,cpuid

    revision = 0
    product = 0

c   Note the order of cpu number is the order in which the
c   computers were introduced. The A600- was the first
c   the A900 came before the A600+ and so on.
c
    cpu = cpuid()
    if (cpu.eq.10) Write(1,*) 'CPU Model is A990 '
    if (cpu.eq.7)  Write(1,*) 'CPU Model is A400 '
    if (cpu.eq.5)  Write(1,*) 'CPU Model is A600+'
    if (cpu.eq.4)  Write(1,*) 'CPU Model is A900 '
    if (cpu.eq.3)  Write(1,*) 'CPU Model is A700 '
    if (cpu.eq.2)  Write(1,*) 'CPU Model is A600-'

    do while (i.le.5)
    call chips (product, revision)

    write (1,100) product,revision

    product = product + 1
    i = i + 1
    enddo

    if (cpu.eq.4.and.revision.gt.3075) write(1,*)
    / 'Congratulations, you have rev4 f/w'

    if (cpu.eq.4.and.revision.le.3075) write(1,*)
    / 'Sorry, you do not have rev4 f/w'

100  format ("Product #: ",i2,"  Octal Revision: ",o6)

end

```

LISTING 2 *CHIPS.MAC*

```

macro
    nam chips,7
    ent chips
    ext.ent

    mic fwid,105301b,0

Product      nop
Revision     nop
chips        nop
             jsb .entr
             def Product
             ldb @Product      Product number to be identified.
             fwid              Get rev #

             sta @revision     Return the revision number.

             jmp @chips

end

```

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LISTING 3

Nitely.Cmd

```

*
* File /mail/admin/nitely.cmd
*
* The following will copy the address file from the local node
* overwriting the existing file at node 1 and node 2.
*
co /mail/admin/addressbook.mail /mail/admin/addressbook.mail>node1 d
co /mail/admin/addressbook.mail /mail/admin/addressbook.mail>node1 d
*
* FTP copy the addressbook file
*
ftp /cmdfiles/ftp.cmd

* End of nitely.cmd

```

Ftp.Cmd

```

Contents of: /cmdfiles/ftp.cmd

open chekov
user manager hp
put /mail/admin/addressbook.mail
ex

```

Q: Is there an easy way to have MAIL/1000 synchronize *addressbook.mail* files between systems without having to copy the file manually or write a program?

A: Yes, there is an easy way, using the file */mail/admin/nitely.cmd*. If this file exists, MAIL will execute it at midnight every night. This file can contain any commands you might wish executed.

For example, you might use it to copy the *addressbook.mail* file to other systems in your network, using DS Transparency or FTP. You could even use it to perform nightly system backups, instead of writing your own program as I showed you last time.

Some sample commands are shown in *Listing 3*. ■

The *12076A LANIC Installation Manual* (p/n 12076-90001) documents the differences between 802 and Ethernet transceivers, and also describes the so-called Ethernet stub cable, which must be used when connecting to existing Ethernet hardware. This cable is supplied with the 12076A as option 001.

One of the differences with the Ethernet cable is a jumper in the LANIC hood, called the "Ethernet sense jumper." It simply grounds pin 24 to pin BB. This jumper "tells" the LANIC firmware that we have Ethernet hardware, and the firmware will not expect the SQE signal. This will allow NS to work. Node Manager will perform a successful Loopback test in the absence of SQE with the Ethernet cable.

Chapter 2 of the 12076A manual describes the two cables.

The part numbers for the two cables are as follows:

12076-63001	IEEE 802	LANIC will expect SQE
12076-63002	Ethernet	LANIC will <i>not</i> expect SQE

If you are using Ethernet hardware, you must use the -63002 cable to prevent the firmware from expecting SQE. IEEE 802 is the recommended standard to use.

The 12076-63001 cable can be modified to work in the absence of SQE by opening the card hood connector and connecting a jumper wire between pins 24 and BB.

Walt Boeninger is a support engineer at the HP Response Center in Mountain View, California. He has been supporting the HP 1000 for more than 15 years.

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Product Focus

HP 500 Windows Application Server

HP has announced the HP 500 Windows Application Server, a network-based solution that supports workgroups of heterogeneous UNIX workstation and X terminal users. The standards-based PC application server is a combination of hardware and software that allows DOS and Windows applications to run in native mode on Intel Pentium processors within a UNIX system-based environment. By using the X Window System, the HP 500 can support any X-capable desktop on the network (X terminals and UNIX workstations).

"The major problem in UNIX environments is access to PC personal productivity tools," said Chris Trojanowski, product manager for the HP 500. "Very few tools have been ported to UNIX." He estimated that maybe 10 or 15 out of 50,000 or 60,000 PC applications have been ported to UNIX. The solutions available to date seem to have compounded

the problem, becoming performance and compatibility problems in their own right—an assertion Trojanowski felt he can make comfortably, based on the high level of interest users have expressed in the new product. "We're being swamped with calls," he said.

Trojanowski stated that the HP 500 provides a dramatic performance increase over all current solutions, including Tektronix WinDD, SunSoft WABI, and Insignia Soft-

Windows, ensuring that PC applications run at 486DX/33-MHz-class performance or better. Existing products are PC emulators, which have to interpret PC hardware instructions onto the UNIX processor. The HP 500, in

contrast, accomplishes all processing on a host computer, requiring no overhead on the desktop computer.

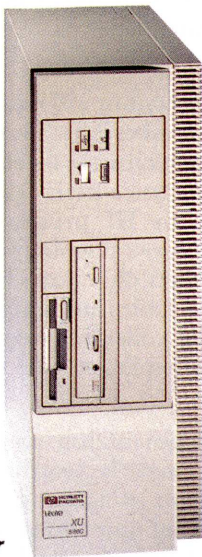
The HP 500 targets those UNIX users who occasionally use "the PC productivity tools that make their work easier." The multi-user system provides PC applications access in a workgroup environment to such common applications as Microsoft Office and serves 5 to 30 users. Conversely, PC emulators "are the products intended for individual users; they use it just one-on-one, meaning one user uses one product."

Flexibility and Performance

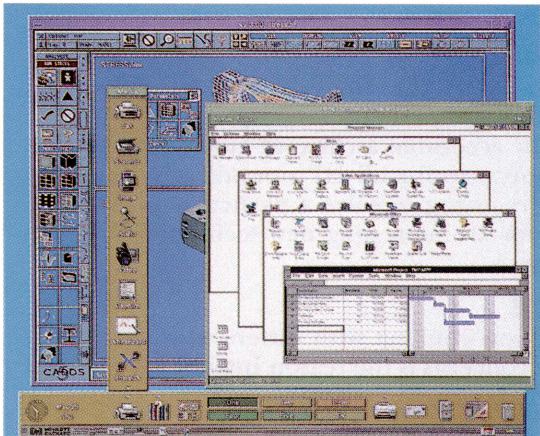
Because the HP 500 runs PC applications over the network, multiple users can access one binary of an active application; in other words, users need only "one copy of the application on the server, but each user has his or her own customization files for this application," Trojanowski explained. He also reiterated, "Since we are running native mode, we provide excellent performance."

The HP 500 consists of standard Intel-based hardware—"either a HP Vectra or equivalent hardware from another vendor," said Trojanowski—that employs either one or two Pentium processors, depending on the number of users on the system. "On top of that we have the SCO UNIX operating system, because it is the easiest to integrate with UNIX networks." Santa Cruz Operation's SCO Open Server Release 5 is a natural choice for the HP 500 because it is a multi-user operating system and is "the most popular UNIX on PC platforms," Trojanowski added.

As a UNIX-based system, the server offers flexible user account setup, as well. Trojanowski noted that administrators "don't have to set up any accounts on



HP 500 Windows Application Server



Typical UNIX desktop accessing HP 500 Windows Application Server

the HP 500," as it allows them to use the UNIX accounts already set up. Users can also elect to set up accounts on the HP 500 if they wish, making it "as flexible as any other UNIX server."

X protocol support is provided by Locus Computing Corporation's Merge product, which HP has dubbed the "X-ifier." This architecture layer exports the Windows display over the network to the X-compliant desktop. To the user, this implementation makes "starting a (Windows) session as simple as clicking an icon" in a GUI such as HP VUE, Trojanowski explained. "It is totally integrated and seamless."

The HP 500 is based on standards, supporting NFS, TCP/IP, Network Information Services, and, of course, the X Windows protocol. HP has added value to these standardized technologies with easy-to-use graphical system administration tools and "various utilities," Trojanowski said. Among the included tools is an application that balances the processing load between servers and another that enables the configuration of users' PC environments from a UNIX system.

The Windows application server is developed by Panacom, the HP division that builds the company's ENVIZEX X terminals. HP's ENVIZEX X terminals have a built-in DOS format and NFS mounted floppy-disk drive, which allow the HP 500 server to see the ENVIZEX floppy as drive "a" of its system. This provides ENVIZEX users with "virtual PCs," Trojanowski said. He added that HP-UX contains utilities that can provide workstation users with the same DOS formatting capability for their floppy drives.

Other Features

Other features include cut-and-paste between UNIX and Windows, as well as

resizable PC Windows. The HP 500 can display 256 colors simultaneously, which takes advantage of workstation monitors and X terminals' superior size and resolution when compared to that of standard PCs. It also supports Windows standard- and enhanced-mode applications and text-based DOS applications.

The HP 500 is also scalable, enabling the system administrator to increase performance for every user at the application-server level rather than at each individual desktop. The 90-MHz Pentium processor enables the HP 500 to run at 486DX/33 MHz-class or better performance on each desktop, a performance level HP decided to match because many users are accustomed to it. To provide investment protection, the HP 500 motherboard is designed to support two processors with a clock speed of up to 133 MHz each.

The HP 500 comes in two hardware configurations. A 15-user hardware bundle includes one 90-MHz Pentium processor (with a symmetric multiprocessing option), 64 MB of RAM, and a 1-GB SCSI hard disk. A 30-user bundle contains two 90-MHz Pentium processors, 128 MB of RAM, and a 2-GB SCSI hard disk.

Both implementations also include Ethernet LAN, a 14-inch color monitor, CD-ROM (SCSI), keyboard and mouse, and a 3.5-inch floppy disk drive. Alternate LAN connections include 10baseT (twisted pair, RJ45) and ThinLAN (COAX), as well as 100-VG AnyLAN networks.

Software-only HP 500 bundles include all enabling software, which is completely installed and configured by the user's Pentium-based server of choice. The Locus Merge, SCO UNIX, HP 500 application, MS Windows, and DOS licenses are offered for 15 or 30 users. Prices are as follows:

DESCRIPTION	LIST PRICE	PER USER
15-user software and hardware bundle	\$16,495	\$1,099
30-user software and hardware bundle	24,995	833
15-user software-only license	5,495	366
30-user software-only license	7,995	266

The HP 500 Windows Application Server became available in August through VARs, dealers, distributors, and HP's direct sales force. Software-only bundles are scheduled for availability in October. ■

Michelle Pollace is the New Products editor for hp-ux/usr.



New Products

Job Scheduling

Operations Control Systems (OCS) has introduced EXPRESS for UNIX 3.01. Key enhancements include addition of a Motif-compliant GUI and alerts that add to the support of HP OpenView and SunNet Management.

EXPRESS Version 3.01 also includes an improved file availability option, which enables systems managers to ensure that the appropriate version of a file is available before a UNIX job can be run. Users can now easily define date-related terms such as "weekend" or "holiday." The graphical calendar shows how the chosen date expression relates to actual calendar days.

EXPRESS for UNIX is priced on a single-tier basis, with no price increase tied to CPU upgrades. Available in the second quarter on HP-UX and other UNIX platforms, EXPRESS for UNIX 3.01 pricing starts at \$7,500 with discounts for volume purchases.

Contact Operations Control Systems, phone: (415) 493-4122, fax: (415) 493-3393.

Mail Canada

Group 1 Software has announced Mail Canada Plus for Open Systems. Mail Canada Plus automatically pre-sorts and qualifies letter, publication, and addressed advertising mail according to Canada Post's specifications, allowing mailers to take advantage of the maximum postal discount rates at every category and level of service.

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greatest possible discounts while bypassing mail destined for Forward Sortation Areas (FSA) scheduled to be restructured by Canada Post. This allows mailers to prepare mail in advance of the anticipated mail date without incurring penalties due to FSA restructuring.

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Contact Group 1 Software—Canada, phone: (905) 844-7273 or (800) 368-5806.

New from Unison Software

UNIX Backup

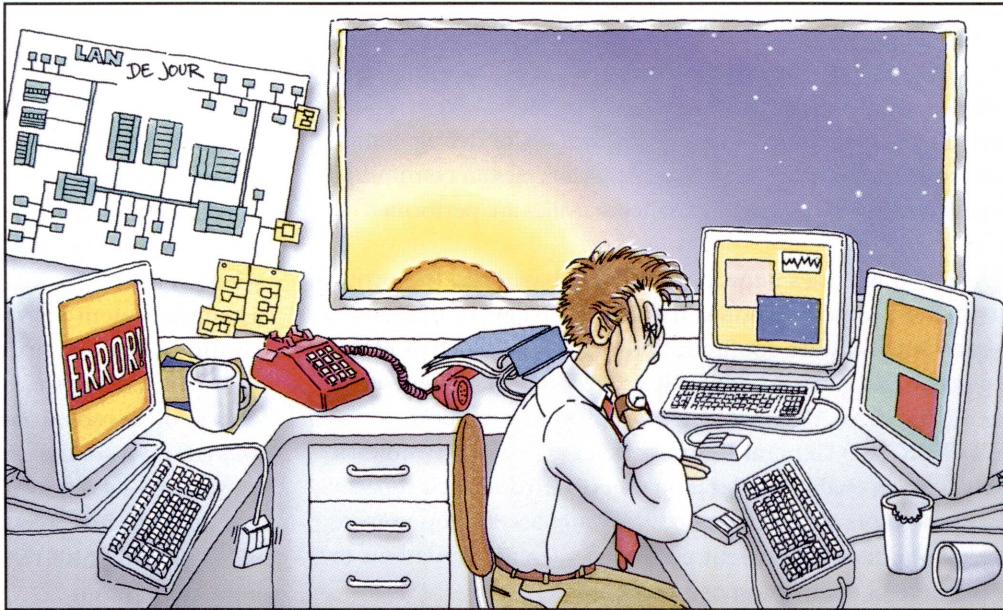
Unison Software has announced RoadRunner Version 1.2. The high-speed backup tool supports networks comprising any combination of HP-UX, IBM AIX, and Sun Solaris systems. Users can manage the backup of an HP-UX user to a tape device on an AIX system, all from a Solaris workstation, for example.

Another powerful new RoadRunner feature permits customers to choose between centrally managing the entire network from a single workstation, or distributing backup management so that each system can be managed locally.

RoadRunner's architecture consists of a Master for administration across the network, definition of storage profiles, selection of performance options, and sophisticated file and directory selection; a Client Agent, which controls data to be stored; and a Server Agent, which controls input and output to various media devices.

RoadRunner 1.2 is available immediately. RoadRunner Master costs \$4,000; RoadRunner Server Agent costs \$2,000; and the RoadRunner Client Agent costs \$300.

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CIRCLE 13 ON READER SERVICE CARD

HP-UX 10.0 General Business Release Announced

HP is shipping the General Business Release of HP-UX 10.0 for HP 9000s. HP-UX 10.0 began shipping to new business customers in early March. Several new products focus on the needs of business-critical and network-intensive environments.

HP-UX Version 10.0 features the journaled file system (JFS), a high-integrity, highly available file system that offers very fast file-system recovery during system reboot. With HP OnLine JFS, the file system can be resized, backed up, or defragmented dynamically, without requiring planned downtime. Applications can continue to access the file systems while these routine maintenance activities are performed on the file system.

The general release also includes network file system-based diskless protocol, an implementation of industry-standard technology. Network file system diskless provides expanded hardware configuration capabilities, such as FDDI, multiple LAN card support, and gateway booting. It also has improved client-server connectivity during reboot or a LAN break and multiprocessor support.

In addition, the HP-UX 10.0 General Business Release features symmetric multiprocessing (SMP), which enables workstation users to expand their capacity by adding additional processors to their systems. SMP enables desktop users to increase the total throughput of concurrent processes, such as simulations or queries, or reduce the time of completion of a single process.

Optional Tools

HP has made available a number of optional tools for the General Business Release, as well. MC/ServiceGuard, HP's Enterprise Cluster product, has been enhanced to support the high-speed system connect I/O bus available on the new HP 9000 K-class servers. Recovery times for full node failures can be as fast as 45 seconds. MC/ServiceGuard has also been enhanced to support HP's advanced communications controller X.25 card.

HP also provides tools for upgrading from HP-UX 9.0 to 10.0. Fast transition links, which are transparent to applications, makefiles, and scripts, provide binary compatibility for the transition to the SVR4 file system directory layout. Customers can use the analysis and conversion toolkit to remove hard-coded file system references so that their code and scripts are no longer dependent upon fast transition links.

A two-user license for the HP-UX 10.0 runtime environment is bundled with HP workstation and servers, with additional license levels available. Optional upgrade planning and implementation assistance is available.

Prices for OnLineJFS range from \$995 to \$8,000. Prices for MC/ServiceGuard range from \$3,900 to \$24,000. JFS and network file systems diskless are features of HP-UX and are included in the price of HP-UX.

Workload Scheduler

Unison Software has announced a Replicated Systems capability for its commercial-strength workload scheduling software, Unison Maestro. Replicated Systems enables Maestro users to quickly set up a workload schedule for multiple systems. HP will

resell Maestro through its worldwide distribution channel.

Instead of applying schedules to an individual system, users now can apply an existing schedule to a group of systems known as a CPU Class. Any new systems added to the CPU Class will then automatically run the schedule applied

to that Class, streamlining the amount of time and effort required to grow a network. Replicated Systems also allows for quick customization of the same schedule across multiplatform systems. The scheduler now checks the IP address of a remote system before commencing communication, providing a more secure infrastructure.

Schedules can be composed, viewed, and edited from the new GUI.

Maestro 4.4 starts at \$14,000.

Contact Unison Software, phone: (408) 988-2800, fax: (408) 988-2236, e-mail: info@unison.com.

Enterprise Resource Planning

QAD has signed a reseller agreement with Oracle. QAD is now said to be the first Enterprise Resource Planning (ERP) system developed with Progress tools to also be available on Oracle7.

Since MFG/PRO is a true client-server application, it doesn't matter where the software or the databases reside. The databases can be split among multiple sites to meet specific customer requirements.

QAD will ship Oracle along with MFG/PRO directly from its distribution center.

Contact QAD Inc., phone: (805) 684-6614.

Client-Server Tool for RDBMSs

Bluestone has announced the newest version of its db-UI/M/X client-server application development tool for relational databases. It supports Informix databases (Oracle and Sybase are already supported), large text and binary large objects (BLOBs) for imaging, and advanced networking capabilities.

db-UI/M/X is said to be the only tool that offers the productivity of visual

programming while allowing developers to base their code entirely on C and/or C++.

The tool supports INFORMIX On-Line Dynamic Server, as well as Oracle7, Sybase V4.9, and Sybase System 10 databases on Sun, HP, and IBM platforms. Quantity-one pricing for the tool is \$6,500. Bluestone also offers upgrades of db-UI/M/X to all users of UI/M/X at a quantity-one price of \$2,250. Bluestone's technology transfer services, including comprehensive online product support and training and professional services, are also available.

Contact Bluestone, phone: (609) 727-4600, fax: (609) 778-8125.

Enterprise-Wide Backup

Chevy has announced InterBACKUP Version 1.5, which includes an object-oriented approach to defining and scheduling multiple simultaneous backups over a distributed network to multidrive tape libraries. The software can arbitrate simultaneously scheduled backup orders or "objects" to available drives.

The use of "classes" enables users to "own" tapes in the libraries that can be automatically assigned to that user's backup requests, and autoloaded by the library's robotics, transparently controlled by InterBACKUP Version 1.5. The user can navigate through the comprehensive database using a virtual file system, allowing the most recent backup to be restored to any directory on the network. The software can perform any type of backup job to any native or remote peripheral located on the network.

Users do not have to know UNIX commands to perform backups and restores. Any UNIX workstation, PC, or Macintosh computer connected on the

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Division Inc. Provision 10**Virtual Reality Accelerator**

Division Inc. has introduced ProVision 10, a virtual reality (VR) accelerator that makes it possible to configure an interactive, fully immersive VR system for \$75,000. It includes an HP Series 700 workstation, the ProVision 10 accelerator, and all the software and peripherals required for professional virtual reality applications.

Unlike standard graphics accelerators, ProVision 10 is designed specifically for virtual reality applications. It offers dual video output required to drive stereo head-mounted displays (HMDs); high pixel throughput (up to 1.994 gigapixels per second), needed to handle the depth complexity of VR scenes; and the performance (up to 500,000 "perspective-correct," texture-mapped, Z-buffered polygons per second) to generate real-time interactive displays of photorealistic scenes. It supports the multi-user VR environment provided by Division's dVS distributed run-time software and supports the dVISE authoring tool, which requires no programming and provides translators for popular CAD and modeling data formats. Applications developed on ProVision 10 can run on HP Series 700 workstations. The VR accelerator supports a full range of VR peripherals, including HMDs, trackers, 3-D mice, and gloves.

ProVision 10 systems for HP workstations are available and start at \$34,000. A complete, fully immersive VR add-on to an existing HP workstation—including a ProVision 10 VR accelerator, Division's IPU (an integrated peripheral unit that combines an HMD interface, a Polhemus tracker, and a 3D mouse), and a high-quality HMD—starts at \$48,000.

Contact Division Inc., phone: (919) 968-7797, e-mail: dbb@divnc.com.



tables but with minuscule system overhead. RTE-UX also includes code conversion facilities for languages such as FORTRAN and for subsystems such as FORMS/1000.

Major subsystems such as IMAGE/1000 are fully supported with the IMAGE/UX product from Denkart, which is also distributed in the U.K. by Zyxomma Software Consultants.

IMAGE/UX is a complete native-mode IMAGE/1000 implementation for HP-UX.

RTE-UX is already in use at several major European sites, where complex HP 1000 applications have been successfully migrated to the HP 9000 HP-UX platform in a relatively short time, Zyxomma notes.

Contact Zyxomma Software Consultants in the U.K. at phone: 44 01202 395453, fax: 44 01202 303595.

COBOL Program Reengineering

Reasoning Systems has announced Refine/Cobol, the customizable reengineering workbench for programs written in the COBOL language, on UNIX workstations. Refine/Cobol is a graphical workbench for maintaining, improving, and reengineering existing COBOL systems.

The workbench supports key tasks in working with COBOL legacy systems, enabling the user to understand code structure, analyze the impact of changes, generate documentation, reengineer, assess, and improve code quality, and export design information to CASE tools, such as Teamwork from Cadre Technologies. Since Refine/Cobol works directly on existing COBOL source code, there is no new methodology to learn.

Refine/Cobol comes with a fully documented reengineering API, so users

network can have its data backed up and restored using UNIX standard formats.

InterBACKUP Version 1.5 provides free driver and stacker support with all its packages: for example, one server plus 50 clients with free driver and stacker support is around \$12,000.

Contact Chevy, phone: (818) 225-6060, fax: (818) 225-9656, e-mail: info@chevy.com.

RTE-to-HP-UX Migration

Zyxomma Software Consultants have announced RTE-UX, a product for HP-UX that enables HP 1000 RTE-based applications to be easily

migrated to HP 9000 systems.

RTE-UX is a proven facility for migrating RTE applications to the HP-UX platform. Produced by Hewlett-Packard in Germany and distributed and supported in the U.K. by O'Meara Thompson Associates, a sister company of Zyxomma, RTE-UX provides a complete RTE environment in HP-UX. This includes comprehensive emulation of most of the intrinsics of RTE such as The EXEC, FMP, the Class System, Resource Management, SHEMA, etc., by means of native-mode HP-UX sub-routine libraries. A small "Daemon" manages the RTE class number and LU

can add customized reengineering capabilities. For example, a major aerospace user customized Refine/Cobol to modularize its payroll system, and other companies have used Refine/Cobol to automate conversion among different DBMSs, hardware platforms, and operating systems.

Contact Reasoning Systems, phone: (415) 494-6201, e-mail: sales@reasoning.com; WWW: <http://www.reasoning.com>.

Open PL/I

Liant Software Corporation has announced that it will port the Oracle Pro*PL/I precompiler to UNIX and incorporate it into Liant's Open PL/I solution—Liant's development environment that transitions mission-critical PL/I applications from proprietary systems to open systems.

Teaming Oracle's Pro*PL/I precompiler, which processes Oracle SQL statements embedded in PL/I applications, with Liant's Open PL/I solution will provide customers with the ability to move legacy PL/I applications from the mainframe to open systems running Oracle databases. Open PL/I is available on the HP 9000 and other UNIX systems.

Pro*PL/I has been available on mainframes for many years. With Pro*PL/I available on UNIX, legacy PL/I applications and data can be rehosted to open systems with increased functionality. Key advantages of migrating to client-server include a decrease in data processing expenditures, improved end-user access to information, and increased application development productivity.

The UNIX version of Pro*PL/I was scheduled to be available in the second quarter of 1995. The list price for a

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Color Printing

AutoGraph International (AGI) has announced Version 4.0 of its EasyCopy/X printing utility software, which allows the printing of color screens or raster image files to most raster or PostScript printers.

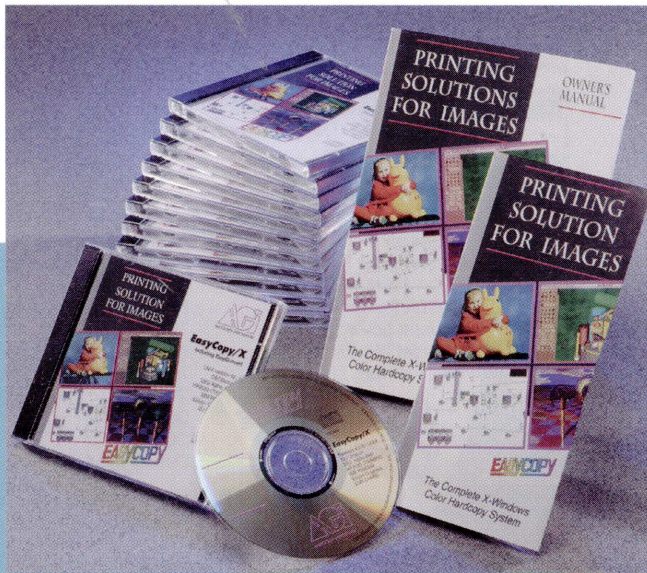
The new software can be used with stand-alone workstations or heterogeneous networks, either as a separate printing utility or integrated into a larger application. Applications range from geographic information systems and CAD systems to seismic printouts and image databases.

The product allows the user to set up and control all printer functions. It also includes AGI's proprietary EasyColor function, which stores printer characteristics and helps optimize color matching to ensure realistic printing.

The new Version 4.0 is now supplied on a CD-ROM for all UNIX workstations. It now provides better support for high-end applications with X and GL screen capture in combination with graphic accelerator cards and better support for capturing starbase windows; command-line print labeling for raw annotation or security identification; drivers for many new printers, including new color laser printers and high-quality, low-priced ink jet printers; and improved support for image file formats and photorealistic image rendering.

EasyCopy/X is available for trial on a CD-ROM from authorized dealers or AutoGraph. Full capability can be unlocked by buying a license. It is priced starting at \$395 for ink jet printers.

Contact AutoGraph International, Inc., phone: (408) 436-7227.



AutoGraph International EasyCopy/X

Contact Ryan McFarland, phone: (800) RM-COBOL or (512) 343-1010, e-mail: info@liant.com.

Load Sharing

Platform Computing Corporation has announced LSF (Load Sharing Facility) Version 2.1, its load sharing and distributed batch processing software. LSF provides integrated support for sequential and parallel jobs on heterogeneous UNIX networks. Version 2.1 allows interoperability with NQS systems so that batch jobs can be sent to Cray supercomputers or other remote hosts running NQS.

Other significant enhancements to LSF's batch processing services include: support for "fairshare" scheduling; aggressive preemptive scheduling of batch jobs; automatic job queue selection; new batch submission features, including the ability to embed options into job script files; new options for configuring batch queues; and enhanced reporting on batch users, batch history, and batch job status. LSF Version 2.1 also provides improved configuration features, including support for user groups.

LSF Version 2.1 supports major UNIX operating systems, including HP-UX.

Contact Platform Computing Corporation, phone: (508) 463-9165, fax: (508) 462-9198, e-mail: info@platform.com.

single-user version of Pro*PL/I is \$600. The list price for Pro*PL/I included with Open PL/I is \$2,950 for a single-user license.

Contact Liant Software Corporation, phone: (508) 872-8700.

Interface Builder

Ryan McFarland (RM), a division of Liant Software Corporation, has announced VanGui for RM/COBOL. VanGui is an easy-to-use interface builder designed to enable COBOL developers to create true Windows applications using

MS Windows controls and Visual Basic custom controls. Developers work in COBOL, without having to learn a new language.

VanGui for RM/COBOL provides developers with a visual development process for updating the user interface of both new and existing RM/COBOL-based applications. It includes an intuitive design tool that integrates COBOL with off-the-shelf Windows and VBX controls. The large inventory of standard MS Windows controls and VBX custom controls in the market can now be integrated with COBOL.

Storage Co-Processor

Zitel Corporation has announced its Storage Co-Processor (SCP). SCP is intended to offer UNIX and Windows NT users dramatic performance improvements of their RDBMS and network application servers by relieving the host system of certain tasks involved in managing data access and updates. SCP processes these

tasks independent of the host.

SCP is uniquely designed to work in conjunction with the SMP (symmetric multiprocessing) host. With its own microprocessors, memory, and storage resources, SCP works in parallel with the host CPU.

SCP improves the performance of servers on LAN, Internet, or Web environments. SCP has been tested with various UNIX platforms with measured success. It is compatible with most NT server environments.

SCP plug-and-play modules use an intelligent controller to manage its solid state memory and high-spin 3.5-inch drives. Maximum storage capacity is 4 GB per SCP module. SCP supports SCSI-I or SCSI-II host adapter connections. It has an intelligent battery backup for data protection.

SCP pricing varies with configuration and starts at under \$10,000.

Contact Zitel Corporation, phone: (510) 440-9600 or (800) 622-5020, fax: (510) 440-9666.

New from InTEXT Systems

World Wide Web Server

InTEXT Systems has announced InTEXT WebServer, a content-based search and retrieval engine for the Internet and World Wide Web (WWW). The WebServer is based on the same core technology as STATUS Client-Service, InTEXT's full-text retrieval engine.

WebServer databases can be searched by popular Web browsers, such as Netscape and Mosaic, and WAIS-compliant Internet clients. Its databases are fully compatible with the document databases created by InTEXT STATUS Client-Server.

InTEXT STATUS Client-Server and

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And if you already use Qedit on the HP 3000, you'll love Qedit on HP-UX because Qedit has the same full-screen and command modes that you already use. You can be productive immediately.

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Internetwork Monitor

Armon Networking has announced the EyeNet inter-network monitor, an implementation of the RMON standard (RFC 1271, 1513) for enterprise-level network monitoring that graphically maps end-to-end network traffic.

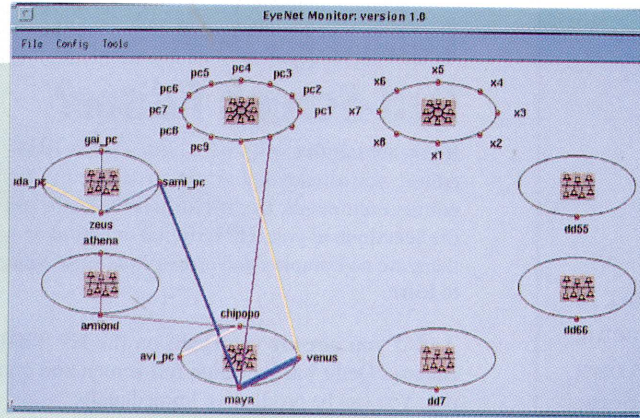
An enterprise-wide view of network-layer conversions is accomplished by consolidating information from multiple RMON probes into a single map display. This functionality allows users to monitor overall traffic flow across the network. The map display provides a graphic indication of traffic volume by selected types (IP, Novell, and others), as well as annotation for easy identification of segments and hosts.

EyeNet allows the user to specify host sets that may include machines on a single segment or any aggregation of individual hosts across segments. The user may also apply a variety of filters to create a specialized view of network traffic.

OnSite EyeNet gives users the ability to view aggregate information for the enterprise monitored at both network and application layers.

EyeNet is priced at \$3,000.

Contact Armon Networking Inc., phone: (805) 965-0859 or (800) 499-RMON, fax: (805) 965-5689.



Armon EyeNet

object-oriented developers with the benefits of the advanced Standard Template Library (STL).

In addition to including a comprehensive multithread-enabled implementation of STL, Systems<ToolKit> addresses interfacing with operating system features such as files, sockets, threads, and processes. It includes a comprehensive set of components that provides a simple and elegant interface to the operating system.

The STL approach is said to result in "superfast" object-oriented code. Systems<ToolKit> includes a comprehensive set of utilities, template containers, and nontemplate containers that follow ANSI standards whenever possible. Hewlett-Packard's STL, with its new design approach, has become the accepted ANSI standard.

Systems<ToolKit> will take the place of ObjectSystems in ObjectSpace's product line. The price is listed at \$375. Users of ObjectSystems, the C++ framework for professional cross-platform UNIX systems development, will be offered free upgrades to Systems<ToolKit>.

Contact ObjectSpace, Inc., phone: (214) 934-2496, fax: (214) 663-3959, e-mail: info@objectspace.com.

World Wide Web Server

Information Dimensions, Inc. has announced BASIS WEBserver, said to be the industry's first commercially available Web server with the features and capabilities necessary for publishing large-scale document collections on the Web. It is capable of managing hundreds of gigabytes of information.

It accommodates ASCII text, word processing, HTML, and SGML documents within the same repository. BASIS

the WebServer are part in InTEXT Systems' Heuristic/Learning architecture, which enables users to have a dynamic system that can retrieve, rank, and summarize crucial data. The WebServer supports all major document formats, including hypertext markup language (HTML), major word processing formats, and ASCII text. When non-HTML documents are retrieved by a Web browser, they are automatically converted for viewing.

The InTEXT WebServer is available for \$7,500. Additional content and filtering agent solutions are available and can be customized for specific online information needs.

Routing Internet Information

InTEXT Systems has announced Object Router, a dynamic profiling and routing toolkit available on HP-UX and other platforms. It provides text and document filtering for corporations' online information systems. With the Object

Router's technology, users can engage intelligent agents to search Internet databases for specific data and dynamically route this data to user-defined folders for easy access and usage.

Object Router allows users to identify, in natural language, their topics of interest. Agents can be developed to watch and route relevant information to users from a particular database, network, or the Internet. It features intelligent, self-tuning filters which can act as information agents.

The Object Router, which is a C language subroutine library, is priced from \$5,000 to \$150,000.

Contact InTEXT Systems, phone: (415) 391-5290, fax: (415) 391-2055.

Class Library

ObjectSpace, Inc. has announced Systems<ToolKit>, a comprehensive set of cross-platform C++ foundation classes that takes the next step in providing

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WEBserver has scalable document architecture and the ability to handle multiple data types with automatic HTML document conversion, so Internet service providers can begin publishing immediately.

Graphical Query Forms and Search Assistants enable users to access information in the manner best suited to their work habits and needs. Navigation Toolbars and Application Toolbars, along with hit-to-hit navigation, eliminate the need to scroll page after page to find a topic. The WEBserver can generate a Virtual Table of Contents for HTML files, allowing users to view all HTML headings instantly, and retrieve just the document component requested. As soon as documents are revised, added, or deleted, the document collection is immediately updated.

BASIS WEBserver is available starting from \$15,000 for the combined system of BASIS WEBserver and the BASISplus database. BASIS WEBserver is available on HP-UX and other platforms.

Contact Information Dimensions, phone: (614) 761-8083, fax: (614) 761-7290, WWW: <http://www.idi.oclc.org>.

Label Writer

CoStar Corporation has announced LabelWriter SE200 and SE200 Plus, said to be the only small-size desktop label printers that can operate on standard CPUs without requiring special software. The SE200 Series supports a subset of the standard Epson FX command language and can print all ASCII characters. Both models are 100 percent compatible with CoStar's bit-map LabelWriter XL printers and are delivered with print drivers for Windows and Macintosh platforms. The standard serial interface enables the printers to

PERICOM's *teem* range of connectivity software tools will help protect your company's investment in existing application software. *teemtalk* for the Microsoft® Windows™ operating system and *teem-X* for the X Window System allow access to an entire mainframe

world, enabling the widest range of PCs using Microsoft® Windows™ and X Window-based display stations including DEC, IBM, HP, Silicon Graphics and Sun to emulate the widest range of terminals.

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HP 2392A, 2622A, 700/92	

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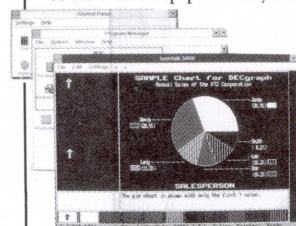
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CIRCLE 95 ON READER SERVICE CARD

Heuristic Cache

SEEK Systems has announced the SEEK Xcelerator, a combination caching controller and Solid State Disk (SSD). The Xcelerator increases performance of most applications with the standard 32 MB of cache memory. By processing in cache, both seek and latency of storage devices are eliminated. Up to 1 GB of partitionable configurable cache is available.

As a caching controller, the Xcelerator notifies the CPU that a write is complete when data is received in cache, freeing the CPU to perform another operation. SEEK's proprietary caching algorithms ensure optimal location of all data to reduce access time when the data is requested.

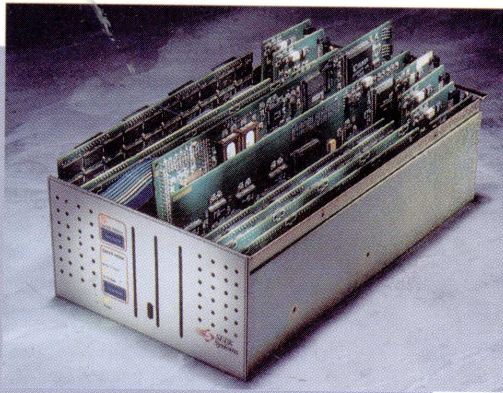
The Xcelerator is also configured as an SSD. Locating the most active files in the Xcelerator provides ultra-fast response and greatly increased performance at lower cost than CPU upgrades.

SEEK System's Xcelerator is fully SCSI-2 compatible and appears to the host as a single peripheral. It enables harnessing up to 12 SCSI channels, each capable of supporting a different host or up to 15 devices, all from a single SCSI ID.

The Xcelerator supports a wide variety of hosts, including HP 9000. It does not require an I/O driver or proprietary components.

The 10-year life battery will preserve all data in cache should there be a hardware failure. All data in cache will be automatically downloaded to an internal hard drive. It can then be reloaded with no loss of data.

Contact SEEK Systems, phone: (206) 822-7400, fax: (206) 822-3898.



SEEK Systems Xcelerator

libraries (DLLs), dynamic data exchange (DDE), and OLE, Microsoft's object technology.

The MainSoft product will provide the functionality and ease-of-use benefits of the current

Microsoft Test user interface. In addition, MainWin Test will enable software engineers or testers to develop a single test script base for both the Windows and UNIX operating environments.

MainWin enables developers to support multiple operating systems from a single source code base by providing the Windows API on all major UNIX platforms with underlying native UNIX performance.

MainSoft's MainWin Test will be available fourth quarter. Platforms include HP-UX 9.x. Pricing will be \$5,000 for the first license, \$4,000 for the second, and \$3,000 thereafter.

Contact MainSoft, phone: (408) 774-3400, fax: (408) 774-3404, e-mail: info@mainsoft.com, WWW: www.mainsoft.com.

connect to virtually any CPU capable of printing to a standard ASCII printer.

The SE200 and SE200 Plus have two built-in fonts, with each font printable in regular, double-height, double-width, and double-height/double-width formats. Eight barcode symbologies support user-definable height, density, positioning, and orientation. The standard print resolution of 203 dpi can be switched into a 138-dpi mode.

The LabelWriter SE200 features a maximum print width of 1 inch, while the SE200 Plus can print up to 2.25 inches wide. A direct thermal print method enables print speeds of up to 2 inches per second.

Other features include the ability to mix text in portrait and landscape modes, white-on-black printing, and

underline mode.

The SE200 lists for \$449.95. The SE200 Plus retails for \$499.95.

Contact CoStar, phone: (800) 4-COSTAR or (203) 661-9700, fax: (203) 661-1540.

Automated Test Tool

MainSoft Corporation has announced a source code licensing agreement with Microsoft Corporation to port Microsoft Test to major UNIX platforms. MainSoft will market and support UNIX versions of Microsoft Test as MainWin Test.

MainWin Test is an automated software tool for testing Microsoft Windows applications ported to UNIX. It will allow the validation of Windows applications ported to UNIX, or application components such as dynamically linked

New from SAS

System Network Performance Analysis

SAS Institute has enhanced the way SAS/CPE software for Open Systems processes data collected from HP's OpenView and IBM's NetView for AIX. SAS/CPE software for Open Systems is a component of the SAS System, an integrated suite of information delivery software for business decision making.

A new timestamp synchronization feature in SAS/CPE software now streamlines the process of accessing data stored in NetView for AIX and OpenView. Employing a fuzzing algorithm, the software gives users the option of automatically preparing data for analysis.

Along with the enhancements for NetView and OpenView, SAS/CPE software now supports additional MIB (management information base) definitions—more than 3,400 metrics are being added.

SAS/CPE software is licensed on an annual basis with fees determined by the number of work units licensed. First-year license fee begins at \$2,965 and drops with an increasing number of work units.

OLAP Solution

SAS Institute has announced OLAP++, a software/service offering that combines professional installation and customization services with advanced object libraries for fast development of customized OLAP (online analytical processing) applications. OLAP++ enables users to draw the data from any source and to summarize it on any platform in a distributed environment.

The OLAP++ solution supports an object-based approach to multidimensional analysis that leverages an organization's existing investment in relational technology.

The software uses the distributed data access and processing facilities of the SAS System to ensure availability of data from various RDBMSs. Available on more than 40 platforms and with interoperability capabilities via ODBC, OLE 2.0, and DDE, OLAP++ class libraries can obtain and analyze data from various sources without a need for a separate database for OLAP.

Contact SAS Institute, phone: (919) 677-8000, e-mail: software@sas.sas.com.

PC-Based X Server

WRQ has announced Reflection X Version 5.0, the latest version of its Windows



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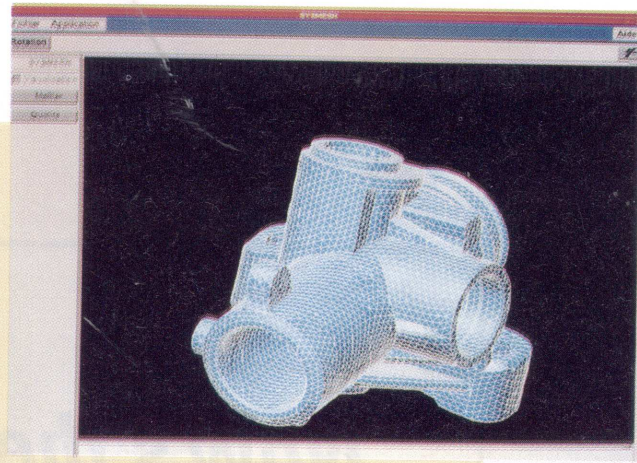
CSI has announced the SYSMESH Version 2 3-D mesh generator, designed to simplify finite element modeling and finite element analysis (FEM/FEA). Version 2 eliminates one of the most tedious, exacting, and time-consuming tasks in engineering analysis: the generation of 3-D or volumetric meshes. SYSMESH automatically generates 3-D meshes from triangular meshed surfaces, without modifying the original surface meshes.

Features in the new SYSMESH include unlimited model size and a minimizing of the number of 3-D elements. This avoids unnecessarily cumbersome models while reducing memory demands and CPU time for the following analysis step. SYSMESH allows a selective display of elements for verifying accuracy and completeness.

SYSMESH operates with triangular (linear or quadratic) surface meshes created with any commercial 2-D mesh generator. It is fully autonomous and interfaces with leading packages. SYSMESH runs on HP 9000 workstations and others.

The software uses the Motif GUI and is available in both English and French versions. FRAMASOFT+CSI is seeking distributors for the North American market.

Contact French Technology Press Office, phone: (312) 222-1235, fax: (312) 222-1237.



700 slot. The communications cards optimize performance in any LAN configuration by employing dedicated RISC communications controllers, extended RAM buffers,

and flow-control processing to offload both CPU workload and network traffic. The products support baud rates up to 115.2 Kbps, full-duplex, per line; offer full modem support; and are port-level configurable. Standard RS-232 connectivity is provided, as well as options for RS-422/485. The 'A' Series is the entry-level solution for building workgroups. The 'AX' Series is the high-speed solution for communications, designed with larger character buffers and integrated RISC processors for high-speed modem and DSU connections and data feeds.

The cards extend the LAN across dialup connections for high-speed remote access, Internet links, or remote LAN communications while freeing the host system for applications processing. Users can use their data communications as a means of accessing remote sites and the Internet while making necessary connections within their own organizations. The series starts at \$500.

Contact Aurora Technologies, phone: (617) 290-4800, fax: (617) 290-4844.

Networking Modules

Garrett Communications has announced Magnum Bridge Port Modules, which bridge-isolate selected user groups to significantly increase network performance in small- to medium-sized networks. Each Bridge Port Module contains a compact local bridge module that filters and forwards packets at full Ethernet wire speed. The minia-

PC-based X server. Version 5.0's performance gains make its drawing speed comparable to a mid- to high-end X terminal, WRQ notes. The new architecture is called Windows Accelerated Video Enhanced (WAVE). Through WAVE, Reflection X bypasses a layer in Microsoft Windows called the Graphics Device Interface and makes calls directly to the device driver. Version 5.0 of Reflection X is between 30 to 40 percent faster than Version 4.1, according to WRQ's internal tests.

Version 5.0 complies with the most recent release of the X protocol specification, X11R6. The XTEST and multi-buffering server extensions are included.

The new Reflection Xpress offers access over telephone lines to X applications with performance that is 10 times faster than CSLIP or PPP. Reflection Xpress allows multiple IP clients to run simultaneously. A scripting language

allows the automation of dialup sessions.

Reflection X Version 5.0 is available either as a stand-alone product (\$469 per copy) or as part of the Reflection Suite for X (\$599 per copy). Version 5.0 of the Reflection Suite for X is an integrated package that includes a PC X server, an NFS client, a TCP/IP stack and utilities, an FTP client with scripting, a variety of character-based emulations, a Web browser, and a news reader. Technical support is free and available for the life of the product.

Contact WRQ, phone: (800) 872-2829 or (206) 217-7100.

Communications Controllers

Aurora Technologies has announced HP-UX workstation and server communications controllers that allow users to add 4 or 8 asynchronous serial ports to the network from one internal Series

Sign up NOW for Spring 1996 Listings

hp-ux/resource directory

The *hp-ux/resource directory* is a complete resource guide for HP-UX users seeking answers. This is one of the industry's most extensive reference guides for HP-UX products, services, and vendors. It will be devoted entirely to HP 9000 users operating in multi-user, workstation, and multi-system UNIX environments. This bi-annual directory, published each year in March and September, is a separate publication mailed out with *hp-ux/usr* magazine, the only HP-specific publication on the market.

Each company is listed by category, with each listing including company name, product, operating environment, and phone number. The cost for a full year listing in the *hp-ux/resource directory* is \$475. Discounts are available for current advertisers in *hp-ux/usr*, *Interact* or the *Vendor Service Source Directory*. Advertisers who run more than one listing per issue also receive a discount. There is a 75-word maximum per listing, with a charge of \$1.00 per word over the maximum.

The Spring 1996 *hp-ux/resource directory* will be published in **March** with **all listings due by December 1, 1995**. For further information contact Nader Saghaei at the Interex Advertising Department 408.747.0227 or 800.468.3739. Fax: 408.747.0947. Written inquiries should be addressed: Nader Saghaei, Interex, 1192 Borregas Avenue, Sunnyvale, California 94088-3439 U.S.A.

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Application Development Tools/4GL	Hardware Subsystems	Project Management
Application Software Design	Help Desk Management	Protocol Converters/ Interfaces-Hardware
Backup Hardware	Human Resources and Personnel Systems	Publications 82Purchase Order Management
Backup Software	Image Processing	Purchasing
Bar Code Data Collection Systems	Image Storage and Retrieval Management	Quality Assurance Tools
Batch Job Management	Industrial Terminals	Records Management
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Case Tools	Inventry Control	Report Writers
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Communications	Laser Printing Software	Security
Communications Servers	Local Area Network (LAN)	Software
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Consulting	Maintenance	Software Distribution Tools
Consulting/Systems Integration	Manufacturing	Software Maintenance and Testing
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Database Management Tools	Memory	Statistics/Data Analysis
Data Center Management	Memory Upgrades	System Integration
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Disaster Recovery	Network Backup Software	Tape Storage
Distribution Resource Planning	Networking	Tape Storage/Data Interchange
Distribution Software	Networking Systems	Technical Documentation/Cross Referencing
Document Management	Network Integration	Telephone Management
Electronic Data Interchange (EDI)	Network Management	Terminal Emulation
Electronic Form Printing	Operating System	Text Editors
Electronic Mail	Payroll	Time and Billing
E-Mail and Directory Integration	PC Compatibility	Time Reporting Terminals
End-User Computing	PC Integration	Training
Executive Information Systems	Performance	User Groups
Facility Maintenance Software	Performance Software	Warehousing & Distribution
Fax Automation	Personal Information Manager	Workstations
Financial	Personnel Management	
Forestry		
Fourth Generation Language		

Other categories may be created as needed.

See reverse side for listing form.

hp-ux/resource directory

Spring 1996 Listing Form

	SINGLE	MULTIPLE	TOTAL
<input type="checkbox"/> Listing (includes two issues)	\$475*	\$375**	\$_____
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* For current vendors who advertise at least 6 times a year in hp-ux/usr, Interact, the cost is \$425.

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ture bridge modules are self-learning and provide "plug and play" bridging services for their segment and associated networked devices. The user address table integrated into each module is sized to accommodate only the addresses of local node users, a number that is typically far less than the 256-node address table maximum.

When it is installed in the bonus port slot in the rear of the Magnum 3000 Stackable Hubs, the Bridge Port Module can isolate a complete stack of users. It may also be installed in any front port of the 3000X or 700X media concentrators to isolate a smaller group of users connected to the concentrator. A multi-mode fiber-ST media connector provides campus-wide connectivity for \$750. BNC, RJ-45, or AUI media connectors provide local connectivity for \$600.

Contact Garrett Communications, Inc., phone: (510) 438-9071, fax: (510) 438-9072. ■

Attention vendors: New product announcements should be sent to New Products Editor, hp-ux/usr Magazine, Interex, P.O. Box 3439, Sunnyvale, California 94088-3439, USA.

Deadline for submission is two months prior to publication.

New Products refers to numerous products by their trade names. In most cases, these designations are claimed as trademarks or registered trademarks by their companies.



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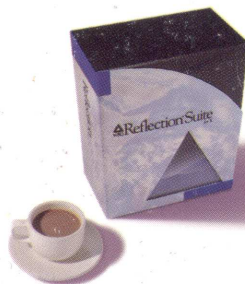
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